Making Place for Space
Making Place for Space
a History of ‘Space Town’ Kiruna 1943–2000
Fredrick Backman
ABSTRACT


Science and technology have a tendency to clump together in places where they spawn other forms of societal activities. Sometimes these places become famous through processes known as place-making, or the social construction of place. Because the scientific and technological activities affect the places, and the places conversely affect the science and technology, it is relevant to study how and why these connections emerge.

This dissertation examines the particular case of the northern Swedish town of Kiruna, which has become known for being a ‘space town’ because of its scientific, technological, and other activities that relate to the near space around the earth. The overall objective is to analyse the processes underlying the making of Kiruna as a space town in the period 1943–2000.

Five parts make up the study. First is an examination of how the development of space physics research in Kiruna led to the setting up of a scientific observatory. The second part studies how the Swedish participation in the European Space Research Organisation made Kiruna the place for a rocket base. Next follows an analysis of how local business efforts contributed to forming a new satellite technology business and the Space House office building. The fourth part concerns how the visions to establish a space ‘university’ eventually led to the emergence of the Space Campus. Last is an epilogue that briefly analyses the space tourism efforts in Kiruna.

A central finding is that the space town has emerged as the result of entwined processes where, on the one hand, ideas about the near space around the earth have led to new activities and physical structures, and, on the other hand, these new activities and built structures conversely have inspired to new ideas. Of importance is also the geographical place where these developments have occurred. Here, a reoccurring argument to placing the activities and structures in Kiruna was the town’s geographically favourable location for specific scientific and technological activities.

Another finding is that the development has gradually led to the emergence of a kind of identity or notion of Kiruna as a particular place for space activities. Although this form of place-making has occurred largely through spontaneous processes, it was also the result of intentional efforts.

Together, these different place-making processes have formed the ‘space town’ of Kiruna.

Keywords: history of science, history of technology, space physics, space science, space technology, geophysics, cultural geography, place-making, regional identity, Kiruna, Sweden, 20th century.
Till mor och far
Ingen annanstans i världen har man så nära till både han där uppe och han där nere.

Lars Törnman
fd kommunalråd i Kiruna

Nowhere else in the world one is so close to both Him up above and him down below.

Lars Törnman
former Municipal Commissioner in Kiruna
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# Acronyms and Initialisms

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<th>Description</th>
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<tbody>
<tr>
<td>AIB</td>
<td>Allmänna Ingenjörbyrå.</td>
</tr>
<tr>
<td>ALIS</td>
<td>Auroral Large Imaging System.</td>
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<tr>
<td>COPERS</td>
<td>Preparatory Commission to Study the Possibilities of European Collaboration in the Field of Space.</td>
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<tr>
<td>CTH</td>
<td>Chalmers University of Technology (Chalmers Tekniska Högskola).</td>
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<tr>
<td>EC</td>
<td>European Community.</td>
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<tr>
<td>EISCAT</td>
<td>European Incoherent Scatter Scientific Association.</td>
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<td>ESRO</td>
<td>European Space Research Organisation.</td>
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<td>EU</td>
<td>European Union.</td>
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<tr>
<td>GIS</td>
<td>Geographic Information System.</td>
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<td>IGY</td>
<td>International Geophysical Year.</td>
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<tr>
<td>IPY</td>
<td>International Polar Year.</td>
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<tr>
<td>IRF</td>
<td>Swedish Institute of Space Physics (Institutet för Rymdfysik).</td>
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<tr>
<td>KGI</td>
<td>Kiruna Geophysical Institute (Kiruna Geofysiska Institut).</td>
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<tr>
<td>KGO</td>
<td>Kiruna Geophysical Observatory (Kiruna Geofysiska Observatorium).</td>
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<tr>
<td>LKAB</td>
<td>Luossavaara-Kiirunavaara AB.</td>
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<tr>
<td>LTU</td>
<td>Luleå University of Technology (Luleå tekniska högskola).</td>
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<tr>
<td>LUTH</td>
<td>Luleå University College (Luleå Tekniska Universitet).</td>
</tr>
<tr>
<td>NASA</td>
<td>National Aeronautics and Space Administration.</td>
</tr>
<tr>
<td>SMHA</td>
<td>Swedish Meteorological-Hydrological Service (Statens meteorologisk-hydrografiska anstalt).</td>
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**SMHI**  Swedish Meteorological-Hydrological Institute (Sveriges meteorologiska och hydrologiska institut).

**UMU**  Umeå University (Umeå Universitet).

**UN**  United Nations.
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Above all, thanks to my wonderful parents for their endless encouragement and love.
Life can be so very 3.141596510828

Berghem, Umeå in April 2015
Fredrick Backman
CHAPTER 1

INTRODUCTION

The above illustration, where the text translates to ‘Space Town Kiruna 2020’, appeared on the cover of a development programme signed in 2008 by a number of actors important to the space sector in Kiruna Municipality (Fig-
The town of Kiruna is depicted at the bottom, close to one of the iron ore mountains. Hovering above the town near the northern lights is a satellite as well as a futuristic spacecraft.

Kiruna is a municipality in Norrbotten County in the far north of Sweden (Figure 1.2). The municipality is sparsely populated, with about eighty percent of the population living in the largest population centre, Kiruna town, and the rest in small villages scattered around the large municipality (Figure 1.3). The municipality has a population of around 20,000 and covers an area of over 20,000 square kilometres, which is roughly half the size of Switzerland.

Archaeological findings have shown that people have lived in the region since the Fennoscandian Ice Sheet started to withdraw over 10,000 years ago. At some point, subsistence evolved from hunting and fishing to also include reindeer husbandry, which depended on seasonal changes. This reindeer herding has been an essential part of the indigenous Saami culture. The area of present-day Kiruna was for a long time part of a large reindeer herding land with reindeer migration paths running throughout the territory. In the seventeenth and eighteenth centuries, villages started to appear in the Kiruna area. The first church and market place were set up in Jukkasjärvi. Farming

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2The northern lights (aurora borealis in Latin) are a phenomenon caused when subatomic particles enter into earth’s atmosphere. The next chapter includes a longer explanation.

3Sweden is divided into 290 municipalities that in turn are organised into 21 counties. Each municipality functions as a local government, with an assembly that is elected democratically in conjunction with the national general elections every four years. The largest population centre in a municipality has the same name as the municipality itself. Kiruna Municipality thus consists of the town of Kiruna and a number of villages. For more on the municipality system, see Vilhelm Persson. ‘Sweden – Local government in Sweden: Flexibility and independence in a unitary state’, in: Local Government in Europe: The ‘Fourth Level’ in the EU Multi-Layered System of Governance, ed. by C. Panara & M. R. Varney. Routledge Research in EU Law. Taylor & Francis, 2013.


and later forestry started to emerge.

![Map showing the location of Norrbotten County and Kiruna Municipality](image)

**Figure 1.2:** Location of Norrbotten County (in yellow) and Kiruna Municipality (in orange) relative to Norway, Sweden, and Finland. The municipalities in the north of Sweden are generally larger than those in the south. Map made in QGIS by the author. ©Lantmäteriet [Licence 12014/00569]

Another important change in the economy of the area came with the discovery of the iron ore deposits in the two mountains Kiirunavaara and Luossavaara that cradle the town of Kiruna. The first known recorded report
on iron ore findings occurred in 1696. Although Swedish officials started investigating the deposits after another sighting in 1736, mining did not start until the nineteenth century. The mining activities became more intense with the invention of the Gilchrist-Thomas production process in the 1870s, leading to a new era when miners settled in the land between the two mountains. The town of Kiruna was officially established in 1900 after the completion of the railway that was going to carry the iron ore from Kiruna and the other mining community Malmberget, situated in present-day Gällivare Municipality, to the Swedish and Norwegian coasts for further deliveries across land and sea.

![Map of Kiruna Municipality](image_url)

**Figure 1.3:** The largest population centres in Kiruna Municipality. Kiruna is the only centre with a population over 1000 inhabitants. Vassijaure is included for reference, although it is not among the largest villages. Neighbouring municipalities are marked in bright grey. Map made in QGIS by the author. ©Lantmäteriet [Licence 12014/00569]
With time, Kiruna became more differentiated and developed new business and industry sectors, but the mining industry remained the largest of all. One of these new sectors was institutionalized in 1943 when the military regiment, then designated I 19 K, was established. The need for such a regiment had to do with the north being an obvious entryway for potential invasions by the Soviet Union (who had invaded Finland in 1939) or Germany (who had invaded Norway in 1940) and as such was a strategically important region to defend, not least because of the iron ore production. Among other new industries was tourism, which commercialized the indigenous Saami culture as well as the sublime landscape with its natural phenomena such as the midsummer sun and the northern lights.

Of particular interest for this dissertation, however, are the space-oriented activities that started to take place in Kiruna in the late 1940s onwards. Since they began, these activities have been centred primarily on the scientific interest in the geophysical phenomena that occur in the outer atmosphere around the earth, especially the northern lights. These new space activities started on a modest scale with only a handful of persons directly involved, but over the following decades, they expanded to involve several hundred people and as such became a relatively large part of Kiruna’s economy and community.

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6 The regiment, which is mentioned again later in this study, was later renamed I 22.
8 Geophysics is the scientific branch that concerns the physical properties of the earth and its environment, including the atmosphere. In the past, this included the study of phenomena that occur in the near space closest to the earth, such as northern lights. At some point, the terms *geocosmophysics* and its variant *cosmic geophysics* started to be used specifically for the space-related aspects of geophysics, at least in Europe. Later, the term *space physics* replaced these variants and came to mean the physics of outer space and celestial objects, in particular those in the solar system. In the United States, it seems a different nomenclature was used, with the older terms ‘solar-terrestrial physics’ and ‘solar-terrestrial relationships’, and the more recent terms ‘astroggeophysics’ and ‘sun-earth connection’. For the Swedish nomenclature, see Bengt Hultqvist. *Introduktion till geokosmofysiken*, Stockholm: Natur o. kultur, 1967; For the terms used in the United States, see Joseph Bassi. *Creating a Scientific Peak: How Boulder, Colorado Became a World Center for Space and Atmospheric Science, 1945–1965*, University of California, Santa Barbara, 2009: p. 23.
During this period, a number of material installations that were connected with these space activities started to appear in various locations in the Kiruna area, including a scientific observatory, a rocket base, several satellite stations, radar antennas, a school, and many other buildings and structures. What had been an area recognized mostly for its reindeer herding, iron ore mining, military defence activities, and tourism was also becoming something else as these new, space-related technological and scientific installations and activities gradually expanded and became part of Kiruna’s identity. With its deep roots in the iron ore mines, Kiruna has commonly been called a ‘mining town’ (gruvstad).\(^9\) Similarly, it has been referred to as a ‘military town’ (militärstad).\(^10\) And as the illustration in Figure 1.1 clearly indicates, Kiruna Municipality has officially promoted the town as a ‘space town’ (rymdstad).

How did Kiruna come to be designated by this epithet? What is the history behind this development?

**Aim and Objectives**

The aim of this thesis is to analyse the processes underlying the making of Kiruna as a space town in the period from 1943 to 2000. More specifically, the study will identify the arguments that key actors or coalitions of actors have used when making connections between Kiruna and the near space around the earth, and it will describe how the actors have implemented these linkages through activities and material installations. In a broader perspective, the study contributes to the understanding of how ideas, activities, and material installations that relate to specific areas of scientific and technological interest can cluster in certain places and can transform the identities of these places.


I am inspired by the transformation in historiography of space science and technology since the 1980s, where scholars have engaged in new analytical perspectives. Instead of the former ‘internalist’ accounts, where space historians parochially tended to focus on either the spectacle of singular artefacts or on momentous achievements by elites, the history writing in the last decades has developed more contextualised approaches that draw attention to a broader range of societal issues in politics, economics, and culture.¹¹

The broader space history of this kind can become more interdisciplinary by integrating it with academic fields that traditionally have been positioned outside history studies. One such branch deals with cultural geography and urban studies.¹² Of course, with regard to the geographical scale of the chosen research topic, it would be possible to write a more general account of Sweden’s *national* space history. Even if this study to some extent concerns the national Swedish space history, my focus is on a much smaller geographical scale. Because the study centres on the town of Kiruna, it will have characteristics of urban history. However, as I will show, it is not simply a matter of studying a *town*, but it also involves studying the larger area of Kiruna Municipality, and to some extent, the even wider northern Swedish *region*. Thus, the study also has characteristics of regional history.¹³

Many of the international activities that have concerned the study or exploration of outer space, especially those activities organized by the United States and the Soviet Union, have often been about reaching the ‘frontiers’

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¹³It should be emphasized here that, strictly speaking, Kiruna was not a fixed administrative unit of a municipality during the time period that is studied. Although this is not of major relevance, these changes will be brought up later.
of deep space, including the manned moon landings and the unmanned probes to the planets of the solar system and beyond. Unlike these activities, the predominant space science and technology in Kiruna have been of a much more modest magnitude and rather ‘down-to-earth’ in more than one sense. Although Kiruna and Sweden have participated in the development of scientific instruments that have been sent to other planets, and although Kiruna’s space physicists frequently analyse phenomena and radiation from outer space, most of the space activities in Kiruna have been restricted to the near space around the earth. Moreover, the bulk of the space-related activities have taken place on the ground in Kiruna Municipality. In the case of Kiruna, it is, therefore, of particular relevance to study this more earthbound space history where the geography of the activities and the material installations have played such a pivotal role.

Based on the aim and objectives stated above, the research questions to be answered in this study are as follows.

- How have knowledge of and ambitions to better understand and use the near space around the earth influenced and transformed existing as well as new space-oriented activities and material installations in Kiruna?

- How have these space-oriented activities and material installations in turn generated new ideas and knowledge of importance to the notion of Kiruna as a space town?

- In what way can places become ‘famous’ by inhabiting ideas, objects, and functions connected with particular science and technology?

**Analytical Perspectives**

My analytical approach is guided by a spatial framework. I am interested in the mutual interaction between, on the one hand, geographic places and specific natural phenomena that are connected with these places, and, on the other hand, the societal activities and notions that emerge in these places and that directly or indirectly relate to the scientific interest in the natural characteristics.
In the past decades, historians of science and geography have shown a growing recognition of what is sometimes called a ‘cultural geography of science’ where the situated nature of science and technology is analysed. In the tradition of geographers such as David Livingstone, David Harvey, Doreen Massey, and Allan Pred, they consider places to be social constructs that are always in a state of becoming. Places (or the more abstract concept of spaces) are not seen as mere backdrops or containers for scientific activities, but rather as active ingredients in the wider societal and cultural life that includes the scientific activities.¹⁴

Given this broader theoretical framework, the following subsections will detail the specific perspectives that the present study will use.

**Science and the place**

Places can be of many scales, ranging from the micro-place, such as specific buildings or plots of land, to the macro-places, which encompass regions or countries. In between are meso-places, which can be seen as collections of micro-places, such as urban milieus.¹⁵ Micro-places can, in themselves, serve as sites for scientific activities. Examples include laboratories, museums, gardens, fields, etc. However, scientific activities can also ‘clump’ together in meso-places and form what are generally described as science cities, science...


parks, technopoles, creative milieus, and similar. In some cases, places of knowledge have only been imagined utopias, as in Tommaso Campanella’s (1568–1639) *City of the Sun* (1623) and Francis Bacon’s (1561–1626) *New Atlantis* (1627), but many examples of realized scientific or technological cities have appeared, with Silicon Valley and the Route 128 corridor, both in the United States, as the perhaps most well-known examples today.

In their seminal study of such kinds of places, the sociologist Manuel Castells and the geographer Peter Hall defined a *technopole* as ‘various deliberate attempts to plan and promote, within one concentrated area, technologically innovative, industrial-related production: technology parks, science cities, technopoles and the like.’ However, to fully understand the phenomenon, they realised they had to investigate the sources of inspiration behind it. This soon led them to focus not only on deliberately planned technopoles but also on the semi-spontaneous technopoles, the giant metropolitan technopoles, and the more elusive phenomenon they refer to as a milieu of innovation. In this study, I will refer to Kiruna mostly as a place of knowledge in order to avoid making a distinction between the different types mentioned above.

One aspect in Castells and Hall’s way of defining and analysing the different types of knowledge places that is of particular relevance to the present

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18 Castells & Hall, see n. 16: p. 8.

19 Castells and Hall suggest a typology of these different kinds of technopoles. The typology is, however, not relevant for the present study. ibid.: p. 9.
study is the notion of whether such places have been deliberately planned or if they have evolved more spontaneously. Here, deliberate establishments of these places means there must be some kind of intention not only in setting up the micro-sites of individual installations, which is obvious, but also in establishing or recognizing the collection of these sites on the meso-site level or even as macro-places. The historian of technology Martina Heßler has pointed out that Castells and Hall confusingly refer to knowledge places as both non-planned and planned. She suggested a distinction between, on the one hand, ‘centrally planned and specially constructed cities and huge areas where science, technology and industry are brought together’ and, on the other hand, ‘more or less unplanned cities and regions which have evolved organically’.²⁰

While I agree with the notion of Kiruna overall being a planned city (see the Place-making subsection), I argue that it is not as obvious to consider the ‘space town’ phenomenon as being planned. This is especially the case when comparing Kiruna to other knowledge places that have been centrally planned, such as Los Alamos in the United States or Akademgorodok in the former Soviet Union. And yet, I would not position myself at the other extreme and claim that Kiruna as a space town has been formed completely spontaneously, or ‘organically’ to use Heßler’s term. Earlier research has suggested that there are certain traits or conditions necessary for a high-tech region or science city to evolve. For example, the presence of a major research university in close proximity is one such condition. Although many examples of knowledge places fulfil this condition, there are also examples of such places that do not have a pre-existing university. Because Kiruna did not have such a university, it is of particular interest to study how the scientific activities evolved there and later also attracted new forms of science-related activities.

The present study will contribute to the research about knowledge places in part by problematizing how the emergence of Kiruna as a space town and as a form of knowledge place relates to the notions of planned and spontaneous developments. A central theme of the study concerns the processes behind the

development of the scientific activities and how they through a sequence of events became permanent and contributed to establishing additional activities there.

Another relevant aspect of the discussion on what constitutes knowledge places concerns the spatial proximity of the different structures and activities. In many international cases, the scale is on the meso-level of parks and cities, i.e. places that are large enough to be inhabited by a number of micro-places like those mentioned above. In the case of Kiruna, this proximity and density is somewhat paradoxical in the sense that, in a regional perspective, Kiruna as a knowledge place is rather easy to identify due to the density of material installations that relate to space science and technology. Relative to the rest of Europe, much of the northern Scandinavian region is very sparsely populated and the population centres and other densities of artificial structures stand out in proportion to the less inhabited surroundings. However, while this is the case, Kiruna’s space-oriented installations, on a smaller geographical scale, cover a relatively wide area. That is to say, in comparison to the population centre of Kiruna and its surrounding nature, with occasional villages here and there, the space-oriented installations are far from concentrated in the town itself, but rather are scattered around (and even outside of) Kiruna Municipality. Because of their function, most of these buildings and structures also tend to be more eye-catching than regular buildings. This duality is something that I will return to because I reason that it complicates the whole idea of what constitutes a knowledge place.

Central to the present analysis of Kiruna as a knowledge place are the people behind the scientific and technological developments. As scholars have argued, a city and its science and technology activities are mutually interwoven in many more or less obvious ways. For example, there is the mutual relationship between, on the one hand, experts of science and technology, and, on the other hand, politicians, entrepreneurs, administrators, and others involved in governing and constituting the city with regard to the different ideas and activities that take place there. In the case of Kiruna, it is perhaps

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not surprising that such space experts have played a central role in the politics of how the space activities should be set up, but they have also had the power to influence other societal activities that are outside the domains of science and technology. Conversely, the local and regional politicians, entrepreneurs, and administrators have influenced in different ways those who represent the space activities.

Another example of how science and the city are interwoven is the broader ambivalent relationships between the two. Scientific activities in a city can reach outside those specific buildings and plots of land specifically intended for these activities, even outside the city itself. Conversely, some of these scientific places are open to the public. In addition, there is ambivalence between scientists who need independence from and isolation from the city while also relying on the services and comforts available in the city. This study will show how all these ambivalent relationships are apparent in the case of Kiruna.

**Place-making**

In connection with studying Kiruna as an emerging type of knowledge place, this study will also pay attention to the concept of place-making. Although this is a relatively broad concept and can refer to many things, I will use it to mean the gradual making or remaking of geographical places into being associated with or known for particular attributes and where science and technology have played central roles in the process. More specifically, I will investigate how Kiruna became, at least partly, remade from being a town that was known primarily for its iron ore mining activities into also being a town known for its blooming space-oriented activities and material installations. This concept has an ingredient of identity; Kiruna is associated with a kind of collective local or even regional identity, which is created officially through the local and regional politicians as well as ‘organically’ through the mass media and through other means.

Thus, in the present study, the place-making concept will include the notion of regional identity. The Finnish humanistic geographer Anssi Paasi has worked out a theory of the institutionalization of regions in which he suggests a conceptualization of regions as historically contingent processes.
An important aspect of this institutionalization is the so-called ‘identity’ of a region.²²

Paasi distinguishes between two ways of connecting identity to geographical regions. Although this dissertation will use only one of these, both are presented here for a better understanding of the framework. The first dimension, which will not be used in this study, has its roots in traditional geography, and he calls this dimension ‘regional consciousness’.²³ By this, he means that the inhabitants of a region to varying extents have a clear opinion of what regional group they feel they belong. For example, the people living in the European Union (EU) might feel they belong to the EU region. The second dimension, which is relevant to this study, he calls the identity of a region (notice the shift in focus from the inhabitants to the place itself), which refers to characteristics of nature, culture and inhabitants that make a region stand out from others.²⁴ In his own words:

In practice[,] discussions on the identity of some region are typically discourses of scientists, politicians, administrators, cultural activists or entrepreneurs that aim to distinguish a region from some others. This takes place through the construction of regional divisions, regional marketing, governance and political regionalization. Such classifications are inevitably based on certain choices, where some elements are chosen to constitute an identity narrative and some others are excluded. Thus[,] they are expressions of power in delimiting, naming and symbolizing space and groups of people.²⁵

The present study will show how this notion of identity is applicable in the case of Kiruna as a space town; different types of actors are involved in the process of characterizing the space activities in Kiruna as distinct from other towns or regions, and they achieve this through different acts such as those mentioned in the quotation above.

Paasi divides this identity of the region, or the second sense of regional identity, into what he calls a subjective and objective part. The subjective part includes images of the region created by insiders (those who inhabit the region) or outsiders (those who live outside), and the objective part refers to scientific classifications, such as the traditional geographical definition of a region (e.g. the geographical area defined by borders as shown on a map).²⁶

I will use this latter dimension, which Paasi refers to as the identity of a region, by showing how Kiruna Municipality can acquire an identity of a space town due to the unique combination of specific natural characteristics (e.g. the northern lights), the material installations that relate to the space activities, and the people who are involved with these activities. In the present study, it will become clear that both subjective and objective processes are involved.

Another important aspect of my way of applying place-making to Kiruna is that not only the horizontal, geographical area of Kiruna Municipality is of relevance, but also the near space above Kiruna and the earth, where, for example, certain geophysical phenomena occur, such as the northern lights. While near space is a relatively vague term, it can be dealt with as a particular place that is intimately connected with the different forms of space activities. For example, different actors or sets of actors have considered this vertical space when ascribing Kiruna and the larger geographic region with certain qualities that they have used in their arguments when justifying new space-related activities. This approach is in line with what scholars have referred to as the articulation of territory.²⁷

With regard to place-making, Kiruna also has a history as a planned city. Kiruna was formed in the late nineteenth century to provide shelter and services to the emerging iron ore mining community. When the architect Per Olof Hallman (1869–1941) completed the first development plan in 1900, it was the first urban development plan in Sweden that was specifically adapted to the

²⁶Paasi, 'The institutionalization of regions: a theoretical framework for understanding the emergence of regions and the constitution of regional identity', see n. 22: 136f.
climate. He designed the streets of Kiruna with respect to the surrounding mountains rather than according to the traditional rectangular grid pattern. Another important contribution was the British-Swedish architect Ralph Erskine’s (1914–2005) 1950s buildings, later described as an ‘encounter between modernism and nature’. Erskine, who became known for his projects not only in Kiruna but also in other parts of northern Sweden and even abroad, had an idea about taking into consideration more explicitly the cold climate and the snowy winter landscape when planning cities in the Arctic region. Even if Kiruna was not strictly speaking unique in this sense, Erskine’s visions have nevertheless made an impression on the town’s architecture, and as such have connected Kiruna with an idea of a particular place. A third example is the recent plans, since 2003, to relocate large parts of the town to a new location due to the mining activities affecting the stability of the ground. This remaking of Kiruna has led to the official slogan ‘Mönsterstaden 2.0’ (the Model Town 2.0), where the ‘2.0’ suggests a new ‘version’ of the Model Town.

Thus, as these three examples suggest, Kiruna has a tradition of being planned and reinvented in such a way that it stands out in comparison with other population centres in Sweden and abroad. Kiruna’s budding space

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28 Throughout this text, all persons who are part of the narrative are of Swedish nationality except where otherwise noted.
31 To be sure, most cities go through planning and reinvention phases but, to my knowledge, no other place has done it in a way that can quite match Kiruna. Some exceptions might be valid. For example, the construction of the massive Three Gorges Dam in China has required the displacement of about 1.4 million people in thirteen cities. The town of Yallourn in Victoria, Australia, with a population peaking at 5,000 inhabitants, was closed and removed to make
industry can be regarded in the light of this tradition of a place that has been planned, re-planned and reinvented. To study Kiruna from a place-making perspective is, therefore, particularly justified.

Equipped with the analytical perspectives outlined above, I will investigate how the different actors have used the near space in different ways to contribute to what, at least in retrospect, can be seen as the making of the space town. This theoretical framework is also echoed in the title of the dissertation; ‘making place for space’ is an intended wordplay that is devised to be understood in several ways. For one, it refers to the place-making concept outlined above. It also refers to the change where parts of the existing geographical area of Kiruna Municipality, with its different contents, economies, cultures, and traditions, gradually makes place for—in the sense of giving way or yielding to—the space activities. These ideas will become more apparent throughout the study.

**Literature Review**

This study relates primarily to three research fields. One concerns space historiography more generally. The second focuses on the history of Kiruna, with an emphasis on those titles that, in part, are specifically about the space activities. The third and final group relates to the theoretical framework of place-making and spatiality.

**The history of space science and technology**

The broader international historiography of space science and technology includes a number of short as well as comprehensive overviews of the emergence of space for the nearby coal mine. It might be that other examples exist, but my view is that the combination of the city being relocated and having a history of being a planned city makes Kiruna rather unique.

gning space activities. What is striking about these is that they tend to focus on the United States and the Soviet Union while the other parts of the world, e.g. Europe, Asia, and Australia, are given little attention. In most of them, Sweden is practically not mentioned at all.


The historian Alexander Geppert has published several titles on what he calls the European astroculture, which he defines as ‘a heterogeneous array of images and artifacts, media and practices that all aim to ascribe meaning to outer space while stirring both the individual and the collective imagination.’

He has edited the anthology *Imagining outer space: European astroculture in the twentieth century* (2012), with contributions from a range of authors, including historians, anthropologists, and artists. In her book *Launching Europe: an ethnography of European cooperation in space science* (1995), the cultural anthropologist Stacia Zabusky performed an ethnographic study of

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38 Ibid.
how cooperation is manifested in European space science missions.\textsuperscript{39} The European Space Agency has published a series of titles that concern its history. For an overview of this project, see ‘The ESA History Project’ (2004).\textsuperscript{40}

The Swedish historiography of works with a focus on the history of space science and technology is, understandably, relatively small. Among those titles that are relevant here is the historian of technology Nina Wormb’s dissertation 

\textit{Vem älskade Tele-X?: konflikter om satelliter i Norden 1974–1989} (2003) (Who loved Tele-X? Conflicts on Satellites in the Nordic Countries 1974–1989). Although her book is about two Swedish satellite projects, it concerns to a large extent how the Swedish space industry has been governed, and her focus is on how new technology can lead to conflicts of various kinds.\textsuperscript{41} Historian of science and ideas Gustav Holmberg wrote his dissertation \textit{Reaching for the stars: studies in the history of Swedish stellar and nebular astronomy, 1860-1940} (1999) on the emergence of Swedish astronomy.\textsuperscript{42} He has also written an article about the astrophysicist Yngve Öhman (1903–1988) and his work in solar astronomy, an article which mentions Kiruna.\textsuperscript{43} Another work with a focus on astronomy is the historian of science and ideas Johan Kärnfelt’s \textit{Allt mellan himmel och jord: om Knut Lundmark, astronomin och den publika kunskapsbildningen} (2009) (Everything between Heaven and Earth: about


\textsuperscript{40}Notice that this overview was written in 2004 and some titles have been published more recently. Karl-Egon Reuter & Johann Oberlechner. ‘The ESA History Project’, in: \textit{ESA Bulletin}, 119 (2004), pp. 48–54; The European Space Agency also hosts an Internet website with the national history projects. \textit{The ESA member states}. Web page. European Space Agency. url: http://www.esa.int/About_Us/ESA_Publications/The_ESA_Member_States (visited on 2015-02-02).

\textsuperscript{41}Of some relevance is also her ongoing project, together with the historians of science Sabine Höhler and Johan Gärdebo, titled \textit{Views From a Distance: Remote Sensing Technologies and the Perception of the Earth}. For Wormb’s dissertation, see Nina Wormbs. \textit{Vem älskade Tele-X?: konflikter om satelliter i Norden 1974–1989}, Kungliska Tekniska högskolan, 2003.


Knut Lundmark, astronomy and the public knowledge production). Kärnfelt and Holmberg are currently collaborating on a larger project about the history of amateur astronomy in Sweden titled Kommunikativa praktiker i svensk amatörastronomi: Kunskapsflöden, informationsteknologier och kärlek till stjärnorna (Communicative practices in Swedish amateur astronomy: Knowledge in transit, information technologies and love for the stars). Another historian of ideas Michael Godhe analysed popular science and science fiction in his dissertation Morgondagens experter : tekniken, ungdomen och framsteget i populärvetenskap och science fiction i Sverige under det långa 1950-talet (2003) (Tomorrow's experts: technology, youth, and progress in popular science and science fiction in Sweden during the long 1950s), which also includes some aspects of space science and technology. Worth mentioning is also the historian Erik Norberg's dissertation Flyg i beredskap : det svenska flygvapnet i omvandling och uppbyggnad 1936–1942 (1971) (Flight readiness: the transformation and emergence of the Swedish air force 1936–1942), which provides some context of relevance to the technological development of rocketry.

The history of Kiruna's space activities

There are ethnological, geographic, and economic studies of Kiruna that mention the space activities briefly although the studies focus on other topics. These works are still worth mentioning as contexts for those who wish to study Kiruna's history.

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47 For a general overview of the Swedish political, economic, and cultural history, see e.g. Neil Kent. A concise history of Sweden, Cambridge University Press Cambridge, 2008.
Other scholarly works that have focused on Kiruna’s space activities include an article by the anthropologist doctorate Marta Nyborg who analysed the working environment at the Swedish Institute of Space Physics (Institutet för Rymdfysik) (IRF) in Kiruna with respect to gender issues. The cultural geographer Ingrid Liljenäs has written about the space industry in Kiruna from an economic perspective. Also worthy of mention is the historian of science Hans Weinberger’s master of science thesis, which is a biography on the medical physicist Rolf Sievert (1896–1966). It includes a section on Sievert’s engagement in Kiruna’s space activities based, in part, on archival material and interviews.

Regarding previous studies in the field of history of science and ideas, the historian of science and ideas Sverker Sörlin has written a number of articles that to a greater or lesser degree focus on this topic. In his doctorate dissertation Framtidslandet: debatten om Norrland och naturresurserna under det industriella genombrottet (1988) (Land of the future: the debate on Norrland and its natural resources at the time of the industrial breakthrough),


which focused on the modernization processes in northern Sweden during the period 1870–1920, he briefly discussed Kiruna in connection with how the concept ‘Land of the Future’ could be maintained in a new form and scope. This latter thought is in line with what I want to achieve with the present study, only it will be done more thoroughly and from a slightly different analytical perspective.

Nina Wormbs’ dissertation, mentioned earlier, includes some passages that detail parts of Kiruna’s space activities, such as the setting up of the geophysical observatory, although these passages are intended more for context rather than making up the core analysis. Contrary to her overall interest in a particular project, my focus is on a particular place. In addition to her dissertation, she has co-authored a couple of articles that are relevant to Kiruna’s space activities.

My own master’s thesis concerned how Sweden became part of the European space collaboration and how this contributed to the establishment of the Esrange rocket base in Kiruna. Its aim was rather broad and the study was intended as a preparatory survey for the present dissertation.

Last of all, there are historical accounts of Kiruna’s space activities written by the practitioners and the governors of the space industry. As the section

54 Notice that Wormbs also co-authored one of the papers together with Sörlin. Wormbs, see n. 41.
55 Another example in addition to those already mentioned is Nina Wormbs, Gustav Källstrand & Karen Fletcher. A short history of Swedish space activities, European Space Agency, 2007.
Material and method will explain, these texts are used as primary sources. Although these scientists, engineers, and officials have covered much of the history of Kiruna’s space activities, they tend to be chronicles without the analytical treatment characteristic for scholarly studies.\(^{58}\)

**Place-making**

The third collection of literature, which can be attributed to the somewhat vaguely defined ‘spatial turn’ move in the humanities and the social sciences, has surveyed how science and technology have been involved in the social construction of particular places.\(^{59}\)

To start with, some of these works do not relate to space science and technology but still are informed by the same broad theoretical framework as the present study. One example is the scholar in American studies Stephen J. Pyne’s title *How the Canyon became Grand: a short history* (1999). It examines

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\(^{59}\) Some starting points are: Finnegan, see n. 14; Withers, see n. 14; David N Livingstone. ‘The spaces of knowledge: contributions towards a historical geography of science’, in: *Environment and Planning D*, 13 (1995), pp. 5–34.
how different sets of actors, including those who based their arguments largely on the science of geology, have redefined and ascribed meaning to the natural area known as the Grand Canyon. In a Swedish context, the historian of science and ideas Christer Nordlund studied in his article 'Hur kusten blev hög: en historisk och landskapsteoretisk studie av Höga kusten' (2008) (‘How the coast became high: an historical introduction to the High Coast (Höga kusten) world heritage site in Sweden’) how geologists and others contributed to making famous the High Coast area in the north of Sweden. Both cases concern the making or remaking a geographical area into something else. What makes these two examples particularly relevant to the present study is that they have a bearing on how a specific geographical area can become famous—or make a career—largely through science connecting the area with a unique history that makes it stand out in comparison to its surroundings. Pyne shows how the Grand Canyon has become known much as a result of geologists who studied its formation. Similarly, Nordlund shows how the High Coast was given unique qualities that contributed to making the area famous. Both areas are today popular tourist attractions, but also symbols of the sublime nature in their respective countries. Kiruna, with its northern lights, can similarly be said to have a rather unique quality ‘discovered’ by scientists and further used and promoted by politicians, entrepreneurs, and others.

While the present study to a large extent is about a town, it also includes parts of the surrounding landscape, primarily defined by the borders of the present-day Kiruna Municipality. Moreover, it includes the near space above Kiruna, with its natural phenomena such as the northern lights, which are seen by many as sublime in a similar manner to how the nature is considered sublime in Pyne's and Nordlund's studies. However, unlike their studies, the focus here is on a population centre together with nature, rather than only on

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nature itself.\footnote{For some background on the size and distribution of Swedish population centres, see e.g. Håkansson, see n. 4. For a collection of key writings on urban development, see e.g. RJ Gates & Frederick Stout. \textit{City Reader}, London: Routledge, 1996.}

In parallel with this landscape-oriented literature are numerous studies of place-making in population centres with a certain concentration of activities in science and technology, such as the different forms of knowledge places (e.g. science cities and technopoles) mentioned earlier. A lot of this literature is written in the context of fields like management economics, political science, or economic geography. In addition to Castells and Hall's title mentioned earlier, there is, for example, \textit{Internet Alley: High Technology in Tysons Corner, 1945–2005} (2008) by the space and computer historian Paul E. Ceruzzi, who includes the space industry as one of many actors in the making of this community in Virginia in the United States.\footnote{Paul E Ceruzzi. \textit{Internet Alley: High Technology in Tysons Corner, 1945–2005}, MIT Press, 2008.} However, in neither of these studies do space science and technology take a central role. Instead, they are rather seen as one of several contributing factors.

The relocation of the town of Kiruna has been analysed in many academic fields. The study that is most relevant to this dissertation is architect Kristina L. Nilsson's analysis of how the relocation of Kiruna affects the town image. She includes a short section ‘The space age Kiruna’ where she explores the connection between the space activities and the image of Kiruna. From a broader analytical perspective, her analysis is close to mine.\footnote{Kristina L Nilsson. ‘Place Reinvention by Real Changed Image: The Case of Kiruna’s Spectacular Make-over’, in: \textit{Place Reinvention: Northern Perspectives}, (2009), p. 33.}

Next are place-making studies whose topics relate more directly to the space outside earth.\footnote{In some of them, the object of study is exclusively in space rather than on earth, e.g. Lisa Rebecca Messeri. \textit{Placing Outer Space: An Earthly Ethnography of Other Worlds}, Massachusetts Institute of Technology, Program in Science, Technology and Society, 2011. Jason N Dittrm. ‘Colonialism and place creation in Mars Pathfinder media coverage’, in: \textit{Geographical Review}, 97.1 (2007), pp. 112–130.} The anthropologist Peter Redfield has published a thorough study \textit{Space in the tropics: from convicts to rockets in French Guiana} (2000) on the crossroads of nature and culture in the history of the French Guiana rocket base.\footnote{Peter Redfield. \textit{Space in the tropics : from convicts to rockets in French Guiana}, Berkeley,} In a framework of colonial history, globalisation, and
science studies, he deals with one specific case where different groups experienced nature in different ways. While a small part of the present study is rather similar to his case, its purpose is broader and its approach includes a range of cases that are all necessary to show how the making of Kiruna as a space town has been carried out.

Finally, a few studies within the place-making framework focus on a geographical place on earth, while also concerning outer space. These works are the closest to the present study, although with some differences. Two of these titles, *Power to Explore: A History of the Marshall Space Flight Center, 1960–1990* (1999) by the historians Andrew J Dunar and Stephen P Waring and *Von Braun: dreamer of space, engineer of war* (2007) by another historian Michael J Neufeld, concern the Marshall Space Flight Center in Alabama, USA, and its connections with, among other things, the region’s racial segregation. The historian Michael B. Petersen’s *Missiles for the Fatherland: Peenemünde, National Socialism, and the V-2 Missile* (2009) concerns the social lives of the men and women who worked at Nazi-Germany’s missile base at Peenemünde.

The *Aerospace History Project*, which is a collaboration between the University of Southern California and the Huntington Library, is documenting the archival material and the oral histories of the space history of Southern California. Peter J. Westwick, historian and director of this program, pointed out that although American space history, including Southern California, has been studied previously, not many of these works ‘consider[ed] the par-

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67 Redfield, see n. 66: p. 15.
ticular influence of the Southern California context. This motivated, he argued, a need to investigate both why this particular region became the focal point for space activities and what consequences this had for the region, the nation, and for the space industry itself. One important reason that this project is rather similar to the present study is the explicit recognition of the geographical context. Although Southern California is of a completely different magnitude compared to Kiruna with respect to geographical coverage, the size of the population in the area, and the number of space-related institutes and structures, both cases concern how space activities have developed in specific geographical contexts. I will return to this matter of size, form, and concentration throughout the study.

The historian Joseph Bassi’s dissertation Creating a Scientific Peak: How Boulder, Colorado Became a World Center for Space and Atmospheric Science, 1945–1965 (2009) was about the making of the city of Boulder, Colorado, and its connections with atmospheric science and space physics. His approach is close to my own in that he showed how local actors in Boulder co-produced or made the community into a centre for studies of the near space around the earth.

I do not know of any studies similar to the American Aerospace History Project and Redfield’s study of French Guiana in the European or other geographical contexts. This justifies a need to fill, at least in part, this gap with a study of Kiruna as a space town in Sweden. This thesis will contribute to this still relatively sparse, international literature. In contrast, while there are studies are about the space history of particular locations in, for example, Europe, Russia, or Australia, these do not explicitly discuss place as an analytical variable.

Material and Method

The material that relates to Kiruna’s space history is rather extensive and heterogeneous. The research process has included material in the following

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72 Westwick even references David Livingstone. Ibid.: p. 2.
73 Bassi, see n. 8.
main categories: archival documents, mass media, official documents, and interviews.

Archival documents have been of central importance. Some archives have proven very useful, such as the National Swedish archives (Riksarkivet), the Kiruna Municipality archive, the archives at the Center for History of Science (Centrum för Vetenskapshistoria) at the Royal Swedish Academy of Sciences (Kungliga Vetenskapsakademien), and private collections. Some archives were more difficult to search and navigate than others. For example, the Kiruna Municipality archive is to a large extent lacking any form of index, which has had an impact on the time spent to locate the desired material, if found at all. Fortunately, the staff at the Kiruna Municipality archive was very helpful and provided free access to the archive. Although some archives did not end up being referenced in this final thesis, they have been used to find leads and inspiration, for example, in finding information about people, events, and other aspects. Thus, despite not being formally referenced in the present study, they have been of great help in the overall research process.

Official national, regional, and local documents, such as reports and policy documents, have also made up a considerable amount of the research material. On a national level, these include, for example, the official parliamentary publications (Riksdagstryck) and the Swedish Government Official Reports series (Statens Offentliga Utredningar) (sou).

Another type of material that has been searched extensively is mass media, especially national and regional newspapers and, to some extent, more

74The Kiruna Municipality archive is, as of this writing, in the process of being relocated to the new town hall.

75These archives include the Regional State Archive in Härnösand, the Norrbotten County Administration in Luleå, the Umeå University archive, and the archives of Institute for Language and Folklore (Dialekt-, ortnamns-, och folkminnesarkivet i Umeå) in Umeå. In addition, a number of archives have delivered by post or email smaller volumes or other collections of documents. These include the archives of the Ministry of Enterprise, Energy and Communications, the Swedish National Museum of Science and Technology, Luleå University, the Swedish National Space Board, Rymdbolaget (the Swedish Space Corporation), the Swedish National Agency for Education, and parts of personal collections. With regard to Rymdbolaget, it should be pointed out that its archive in Solna, Stockholm has no structure, and only two persons can find documents there. However, as of this writing, the National Archives are collaborating with these two individuals to transfer parts of the archive to the National Archives.
recent radio and television broadcasts and documentaries. Of these, this study has primarily used newspapers. The two national newspapers Dagens Nyheter (Stockholm) and Svenska Dagbladet (Stockholm), and the two regional newspapers Norrländska Socialdemokraten (Luleå and Boden) and Norrbottenskuriren (Luleå), have been of the greatest use.

The investigation has also used different types of reports, chronicles, and ephemera published by the space institutions. Examples include the annual reports published by the IRF (and its predecessors) and the Swedish Space Corporation (earlier known as Svenska Rymdaktiebolaget AB, or Rymdbolaget for short). Here, the focus has been on texts that have a broader, sometimes promotional character about them. Because these texts were intended mostly for external policy makers, business contacts, or the public, they have been useful in my research. In comparison, the more scientific and technical publications, aimed at a more esoteric audience have largely not been included.

Regarding interviews, I have talked to some more senior representatives of the different space activities either in person or via telephone or email. In addition, I have had conversations that, although not planned as interviews, proved helpful. These interviews have ranged from shorter communications through emails to semi-structured interviews that lasted a few hours. I did most of the longer interviews rather early during the research process with the intention of finding out which topics they considered important to talk about. These interviews functioned mostly as additional support when formulating the research questions as well as in the process of locating the material.

One type of media technology that is not mentioned above is the World Wide Web, which has been used extensively during the research process. To begin with, I have used it when locating many of the above sources. For example, the National Archives Database (Nationell Arkivdatabas) was useful in finding much of the archive material, and different library databases (e.g. the Libris database at the Royal Library and the Album database at Umeå University (Umeå Universitet) (umu)) were used to find all forms of printed material. Another useful search method has been more generic Internet search engines, above all the Google suite (primarily the main Google and the Google Scholar websites), to locate all sorts of primary and secondary material. To some extent, I have also used different types of web archives, for example, the Internet Archive’s WayBackMachine (to see what the websites of
old space institutions used to look like) and Projekt Runeberg (to find older dictionaries and Who is Who-type publications).

Although the web is a valuable tool and can provide leads in the process to find information, it is lacking and unreliable in many aspects and does not index all archives and collections. Consequently, a lot of searches have been undertaken using different kinds of bibliographies, printed indexes (for instance, national Swedish newspaper and magazine indexes, encyclopaedias, biographies, and bibliographies related to topics such as space science, space technology, and Kiruna), and traditional index cards (for instance, at the Center for History of Science at the Royal Swedish Academy of Sciences). In addition, I have spent many hours at the newspaper microfilm archive at the UMU Library.

The different sources have been used to varying degrees between the four empirical chapters of this text. For example, the documents available at the Center for History of Science at the Royal Swedish Academy of Sciences relate primarily to the first empirical chapter, while newspaper articles occur in all four chapters. This uneven distribution is due to the different time periods and activities that each chapter focuses on, which is explained in the CHAPTER OUTLINE section.

**Delimitations**

The history of Kiruna’s space activities can be said to have started in the early 1900s, and it is still, as of this writing, a process in the making. Because of the difficulty in covering the entire period, this study will focus on certain aspects and intervals of the history.\(^\text{76}\) An important constitutive event in the early phase occurred in 1943 when the Swedish Government started an investigation into establishing a new geophysical observatory. In the present study, this will serve as a watershed between the earlier phase, where the activities concentrated on geophysics more broadly, and the recent phase where

\(^{76}\text{Regarding the problem of producing complete accounts of events, see e.g. Jeff Hughes. ‘Whigs, prigs and politics: problems in the historiography of contemporary science’, in: }\text{The historiography of contemporary science and technology, ed. by Thomas Söderqvist. Vol. 4. Psychology Press, 1997: p. 25.}\)
the activities were on the space-related aspects of geophysics. The former phase will only be described and analysed in order to provide a background and context for the latter phase. Consequently, the study starts with a short background, followed by an analysis of the governmental investigation.

The reason for ending the analysis with the events that took place in 2000, specifically the inauguration of the so-called Space Campus, is mostly because of the difficulty in finding a suitable later event that would be motivated for inclusion in the study. The Space Campus inauguration was of such symbolic importance that it deserved to be covered. However, the epilogue in the concluding chapter will mention briefly a specific development that has continued into the 2000s, but only as a way to wrap up the analysis and connect the entire study to the illustration in Figure 1.1 at the beginning of this introductory chapter.

As a result, the study covers the period from 1943 to 2000. The analysis focuses on key developments in this time span with regard to the aim and research questions stated earlier.

For the most part, I have searched material that relates primarily to the constitutive aspects of the physical installations and the space activities connected with these. By this, I mean the processes that include the genesis of the ideas, the planning and decision-making stages that precede the establishment, and up to the inauguration of the installation or the beginning of the activity. As a result, the events that follow the establishment are not included unless they are relevant to the objectives of the study. The reason for this delimitation is that my intention, as the research aim and questions indicate, is to capture the constitutive aspects of the developments, which mostly occur in the initial setting up phases. For example, when selecting material that relates to Esrange, I have almost exclusively studied the material leading up to its inauguration in September 1966. What happens after these constitutive phases will be touched upon briefly when necessary to provide context. Consequently, some events, projects, and other developments that can be seen as fundamental to the broader history of Kiruna’s space activities will not be included in this study.

Admittedly, this delimitation involves risks. One can argue that the making processes also occur after the constitutive phases. While I acknowledge that this might be the case, I maintain that a more in-depth analysis of the
constitutive phases is more fruitful than accomplishing only a broader and more sweeping analysis of the entire temporal development. Another risk is that the constitutive phases are focused on the perspective from above, on decision makers, policy makers, and network builders, while the perspective from below—the public and the inhabitants of Kiruna—tends to become excluded. However, it has been difficult to locate sources that can reveal something about this latter perspective. It would be possible to do an ethnographic study, although this would only capture the present-day opinions and not the historical dimension. Fortunately, newspapers can provide some insight into the atmosphere among the public.

Geographically, the focus is on the space developments in Kiruna Municipality rather than on the population centre itself. It should be noted here that during the 20th century Kiruna went through a number of administrative transformations. Starting in 1908, the population centre Kiruna was part of a unit called ‘rural district’ (municipalsamhälle). This changed in 1948, when it was reorganized into Kiruna Town, and in 1971 it was reorganized again into the present-day form of Kiruna Municipality. Thus, in the two first empirical chapters, I will refer to Kiruna mostly in terms of its administrative capacity of a ‘town’ form rather than a municipality.

With regard to the geographical focus, although some space activities extend outside the present-day municipality borders, for example, some permanent northern lights cameras are located in the neighbouring municipalities of Gällivare and Pajala and even one in Norway, Kiruna is at the centre of all these activities. However, the geography of the space-related activities is a complex matter that will be discussed further later in the study.

As far as I know, Kiruna is the only Swedish population centre that has been promoted as a so-called space town by local and national authorities. Although other Swedish population centres have space-related institutions and industries, none of these appears to quite match Kiruna as the (alleged) space town of Sweden. This motivates a focus on Kiruna rather than any

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77 In a documentary film series Resan genom Rymdsverge (The Journey Through Space Sweden) from 2011, the idea of Kiruna as a unique space town is to some extent challenged. This includes visits to all the cities in Sweden which the film makers considered were of relevance to the space industry: Lund, Onsala, Göteborg, Jönköping, Norrköping, Stockholm (two episodes), Uppsala, Luleå, and Kiruna. See Resan genom Rymdsverge. Web page. URL:
other place in Sweden. Conversely, although it would be possible to zoom in and study only part of Kiruna’s space activities, such as the Kiruna Geophysical Observatory (Kiruna Geofysiska Observatorium) (KGO) or Esrange, it would be problematic to do such a restricted study of Kiruna’s emergence as a space town because the broader development would be lost. Thus, rather than a study at the micro-level, it is the meso-level and perhaps also the macro-level that is the most appropriate for the present thesis.78

Chapter Outline

The bulk of the dissertation consists of this introduction chapter, followed by four empirical chapters, and it ends with a concluding chapter.79 Overall, the empirical chapters are structured chronologically, starting in 1943 and ending in 2000. Each one, however, concentrates on key events within a more narrow time span, which means the entire period from 1943 to 2000 is not covered in equal amounts. The focus areas are the establishment of the KGO, the setting up of the Esrange sounding rocket range, the formation of the remote-sensing business activities, and the establishment of education and the Space Campus. In order to avoid having too large temporal gaps between these four chapters, they also contain some more sweeping developments, although, as mentioned earlier, the ambition is not to cover all events.

The first empirical chapter, Making place for science, which follows this introduction, will show how and why Kiruna from the beginning became the site for space physics research. In order to provide a background and context for the analytical part, the chapter will start by briefly describing what the core of the space physics research in Kiruna is about and then will proceed with describing the first research stations, where such research was done. After that follows the analytical part, which starts with the study of how the KGO was established, a phase that began in 1943. The chapter ends

78 Regarding the micro-, meso- and macro-levels, see the subsection Science and the place.
79 The first two chapters share some common elements with my Master’s thesis. Backman, Från föhn till feu! [Elektronisk resurs] : Esrange och den norrländska rymdverksamhetens tillkomsthistoria från sekelskiftet 1900 till 1966, see n. 56.
with the inauguration of the KGO in 1957.

In the next chapter, Making Place for Technology, there is first a background section that describes the international and Swedish reaction to the launch of the Soviet Sputnik satellite in 1957 and how this led to an ambition to organize European space research. The chapter then briefly describes, also for context, the first rocket experiments that were carried out in the early 1960s in the Jokkmokk area south of Kiruna. In parallel with these two more descriptive parts is an analysis of the organisation of Swedish space science with a focus on the aspects that are of relevance to Kiruna. The second half of the chapter is dedicated to the analysis of the setting up of the Esrange sounding rocket base, and the chapter ends with its inauguration in 1966.

Chapter 4, Making Place for Business, has four main parts. First is a description of how Kiruna Municipality suffered an economic crisis because of problems in the iron ore mining industry, which reflected larger international industrial problems at the time. Next follows a short description of how Sweden started to organise the satellite imaging activities, where the emphasis is on events of relevance to Kiruna. The third part is an analysis of how Kiruna Municipality dealt with the mine crisis by putting stakes in the computer and space industry. A good part of this section concerns the Vision 84 conferences that were held in Kiruna and where the idea of Kiruna as a future town was first promoted on a large scale. The chapter will investigate how the so-called Space House was set up in central Kiruna in order to provide facilities for the new computer and space businesses, above all with regard to the remote-sensing company Satellitbild AB. The last part of the chapter contains three cases that I find important to the overall study but that are not directly related to business activities.

The fourth and final analytical chapter, Making Place for Education, is made up of two main parts. The first focuses on the visions in the mid-1980s to establish a so-called space university, and it proceeds with how these visions became a matter of investigation. The second part is about the developments in the 1990s. Here, the analysis will focus on the debates regarding the plans for higher education. Of central importance is the discussion concerning where in Kiruna the new education would be physically placed. The chapter ends with the inauguration of the Space Campus in 2000.
The last chapter of this dissertation, Concluding discussion, begins with a section Epilogue: Making place for tourism that very briefly analyses a fifth aspect of the space activities, space tourism. This epilogue will also link back to the illustration that started this dissertation. The rest of that chapter is a discussion of the overall findings of the study.
CHAPTER 2

MAKING PLACE FOR SCIENCE: KIRUNA GEOPHYSICAL OBSERVATORY 1943–1957

The International Geophysical Year (IGY) in 1957–1958 was a global scientific effort to explore the earth and the near space around the earth.\textsuperscript{80} It was modelled on the first and second International Polar Year (IPY), which had taken place in 1882–1883 and 1932–1933. While the first two IPYS had focused on polar studies, this third installation concerned geophysics more broadly, encompassing more traditional earth sciences, such as oceanography and seismology as well as sciences that studied space, such as ionosphere physics. The IGY was a so-called big science project that involved participants from over sixty nations. New scientific research stations and observatories were set up around the globe, primarily in the polar regions. Sweden’s primary contribution was the establishment of the KGO, which focused on studies of the near space.

However, the KGO was not the first setting for space-related research activities in the Kiruna area. Since the early 1900s, geophysical research activities that involved space studies had taken place in the vicinity of the

\textsuperscript{80}The event started on 1 July 1957 and ended on 31 December 1958 to allow for two field seasons at both poles of the earth.
town of Kiruna, and before that many scientists had travelled in the northern Swedish region to study different forms of space phenomena, including the northern lights. Thus, the establishment of the KGO can be seen as part of a phase that had started earlier. While the earlier geophysical research in the area encompassed both studies of the earth itself and the near space around the earth, the new geophysical research that was connected with the KGO was focused on near space. Thus, the KGO can be seen as both the latest development in a sequence of events and as the beginning of something new.

Of central importance to the decision to place the new observatory in Kiruna are the arguments, above all scientific ones, that were used by the actors involved. It is relevant to study how these arguments were connected with not only the geography on a global, national, or local level, but also with the near space around the earth.

Earlier research has shown that places of knowledge can exist in a multitude of forms and sizes, including small-area places such as university campuses, medium-sized places such as cities or corridors, and large-scale places such as regional clusters. In some of these places, the scientific settings have a more concentrated physical form with the different buildings and sites clumped together, while in other places, the buildings are more scattered. It is similarly interesting to investigate how and where the first geophysical scientific activities and settings in the Kiruna region took form. By the time the first space-related activities became permanent in the region, the town of Kiruna had already started to form. However, because the initial research stations were placed relatively far from the town itself, it is problematic to consider this phase of the development as the beginning of scientific activities inside or in close vicinity to Kiruna as a population centre. This physical environment is, however, relevant to study in the context of previous research on knowledge centres, where important variables have included the spatial concentration and composition as well as the proximity to population centres.

In addition, Kiruna had already started to form as a company town with the mining company Luossavaara-Kiirunavaara AB (LKAB) as the dominating

industry. It is, therefore, interesting to observe what the addition of new space science activities meant for the idea or sense of the place.

These different ways of designating, building, using, interpreting, and identifying a place is what constitutes the *making* of a place. Thus, when a place takes form—whether it was Kiruna as a company town or through the new space activities—it is not only a matter of how the physical place was first selected or designated for these activities, but also a matter of other social variables that constitute place-making.

This first empirical chapter will analyse and describe how Kiruna was initially selected and accentuated as the site for geophysical research and how this led to the setting up of the geophysical observatory in time for the start of the IGY. The primary focus is on the events from 1943 to 1957, starting with the planning of the KGO and ending with its inauguration. This time span is adequate for analysing how the initial place-making process emerged. However, in order to help the reader to better understand these events, the chapter will begin with a contextual section that briefly describes the auroral studies that constitute most of the space-oriented activities at the KGO and how these led to the first scientific research stations that did space-oriented research in the larger Kiruna area from the first decade of the 1900s leading up to 1943.

**Funnelling down on the Swedish north**

**Circumpolar ring**

Ideas about the auroral lights have been around since ancient times, ranging from mythological to scientific. Research has shown that humanity’s interest

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83 For a broader introduction, aimed at the layperson, to the aurora, see e.g. Asgeir Brekke & Alv Egeland. *The northern light : from mythology to space research*, Berlin: Springer, 1983; Sandahl, see n. 57.

84 To the indigenous Saami in the Sápmi region in the northern parts of Fennoscandia (which includes Kiruna), the auroral lights were part of their astral and celestial cult. See e.g. Bo Lundmark. *Beriv mánna nástit : sol- och månkult samt astrala och celesta föreställningar bland samerna*, Diss. Uppsala : Univ. Umeå: Västerbottens läns hembygdsförening, 1982:
in the aurora has a long history dating back at least to Babylonian astronomical texts.\(^8\) The scientific interest in the aurora intensified in the eighteenth century, largely as a result of a strong aurora on 6 March 1716 that was seen throughout large parts of Europe (e.g. in Italy and Ireland). One important discovery in this century was made in the 1740s by the astronomers Olof Hiorter (1696–1750) and Anders Celsius (1701–1744) who, based on previous findings by above all the English astronomer Edmund Halley (1656–1742), found that the aurora was connected with the magnetic field around the earth.\(^8\)

At first only the northern lights were known, but in the late eighteenth century, the existence of the southern lights were also discovered. However, it turned out these southern lights were visible at latitudes where it was difficult to sail, and it was easier to reach areas where the northern lights were visible. Consequently, rather than going south, many scientists who wanted to study the phenomenon travelled to the north.\(^8\)

Observations of the northern aurora indicated that, while they seemed to be more frequent further north, they also seemed rather rare at the very geographic North Pole. In other words, it was as if the lights were restricted to an area relatively south of the North Pole. The astronomer Pehr Wilhelm Wargentin (1717–1783) is likely the first to have suggested this idea of a circumpolar auroral ring.\(^8\) Of particular relevance to the present study is how

\(\begin{align*}
\text{pp. 141–154; Bo Lundmark. ‘They consider the sun to be a mother to all living creatures’: the sun-cult of the saamis’, in: Saami pre-Christian religion: studies on the oldest traces of religion among the Saamis, ed. by Louise Bäckman & Åke Hultkrantz. Stockholm: Almqvist & Wiksell International, 1985, pp. 179–188; Sandahl, see n. 57: 19ff.}
\end{align*}\)

\(\begin{align*}
\text{\(^8\) F Richard Stephenson, David M Willis & Thomas J Hallinan. 'The earliest datable observation of the aurora borealis', in: Astronomy & Geophysics, 45.6 (2004), pp. 6–15.}
\end{align*}\)

\(\begin{align*}
\end{align*}\)

\(\begin{align*}
\text{\(^7\) Svante Lindqvist. 'The spectacle of science: an experiment in 1744 concerning the Aurora Borealis', in: Configurations, 1.1 (1993), pp. 57–94.}
\end{align*}\)

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\(\begin{align*}
\text{Vidar Enebakk. 'Appropriating the aurora: Christopher Hansteen and the circumpolar}
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the peculiar \textit{spatial} character of the aurora borealis meant that the lights were more likely to be observed in a restricted circumpolar band.\textsuperscript{89} The American mathematician Elias Loomis (1811–1889) compiled many sightings and reports on the locations and frequencies of the northern lights observations. His conclusion was that the aurora was most likely seen in a belt stretching across northern Scandinavia, northern Siberia, Alaska, Hudson’s Bay, and the southern part of Greenland.\textsuperscript{90} Several other scientists have continued to show how the auroras tend to appear in an oval-shaped belt or zone around the North Pole.

In the nineteenth century, scientists linked the terrestrial magnetism and the aurora to the sun, first with the discovery of the sunspot cycles and later with the connection between these cycles and geomagnetic disturbances. In 1878, the French physicist Henri Becquerel (1852–1908) proposed that the sun is the source of the particles that cause the aurora. Another important contribution was made in 1903 by the Norwegian physicist Kristian Birkeland (1867–1917) who discovered field-aligned currents during the auroras. He suggested that it was electrons from the sun that caused the aurora.

The notion that the sun was involved became more sophisticated in the twentieth century when scientists learned more about how the magnetosphere around the earth interacted with the sun (see Figure 2.1). When subatomic particles from the sun reach the earth they are forced by the earth’s magnetosphere to concentrate around the North Pole and the South Pole. My way of seeing this phenomenon is that the earth’s magnetic field acts much like a funnel that forces these particles to ‘funnel down’ on the two circumpolar regions where they cause the auroras.

\textsuperscript{89}Enebakk, see n. 88: p. 189.

Thus, the aurora is a phenomenon that normally does not appear all over the earth but mostly in a rather specific geographic region. Kiruna happens to be in that region, and as such, Kiruna is an ideal location for studying the aurora, whether as a scientist or a tourist. However, before showing how Kiruna became a place for such studies, it is also relevant to describe how Swedish authorities at an early stage largely ignored the northern Swedish mainland with regard to scientific exploration.
Recognizing the Swedish north

The first IPY in 1882–1883 was an important step towards more permanent and reliable measurement stations. Fourteen meteorological and magnetic observation stations were established; twelve were set up in a circumpolar ring in the Arctic, and two were set up in the southern hemisphere. These twelve northern stations were to a large extent situated in the northern auroral belt.

Although the Swedish mainland territory did not have any stations during the IPY, Sweden operated a station on Spitsbergen Island, which was a nationless territory. The primary reason for this Swedish presence on Spitsbergen rather than on mainland Sweden is that between the 1850s and the first decade of the 1900s, what is referred to as the great age of Swedish geographical exploration, the Swedish national self-image contributed to ambitions to show scientific and territorial superiority there. Thus, the Swedish focus was on the higher north rather than on the Swedish mainland territory.

The scientific interest in the northern Swedish mainland did not become

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91 The locations of the twelve Arctic stations were Mossel Bay on Spitsbergen, Sweden; Bossekop, Norway; Sodankylä, Finland; Malyy Karmakuly, Novaya Zemlja, Russia; Dikson, Yenisey River, Russia; Sagastyr Island, Lena Delta, Russia; Point Barrow, Alaska, USA; Fort Rae, Great Slave Lake, Canada; Kingu Fjord, Baffin Island, Canada; Lady Franklin Bay, Ellesmere Island, Canada; Godthåb/Nuuk, Greenland; and Jan Mayen Island, Norway.


93 The entire archipelago that includes the island of Spitsbergen was known as Spitsbergen until 1925 when it was renamed Svalbard.

extensive until the real breakthrough of industrialisation, which in Sweden is considered by many scholars to have started in the second half of the nineteenth century.\textsuperscript{95} This breakthrough contributed to the construction of the iron ore railway between the town of Luleå on the Swedish coast and the ice-free Atlantic port of Narvik on the Norwegian coast. The railway, which at the time of its completion in 1902 was the northernmost in the world, was primarily intended to deliver iron ore from the mining towns, not least Kiruna, to the coasts of Sweden and Norway. It also became an important prerequisite, or at least convenience, to establish the first permanent research station in the Kiruna area.\textsuperscript{96}

An important visionary and entrepreneur behind the establishment of this scientific station was the geologist Fredrik Svenonius (1852–1928) who often, in the spirit of scientific explorers such as the botanist Carl von Linnaeus (1707–1778) and on behalf of the Geological Survey of Sweden (Sveriges Geologiska Undersökning), travelled through Lapland. He imagined how the railway would transform the economy and culture of the region, but also that it would enable scientific exploration.\textsuperscript{97} His vision was in accordance with the larger national plan to explore and utilize natural resources such as the vast forests


\textsuperscript{96}The railway, which is Swedish was referred to as Riksgränsbanan or Ofotenbanan, was inaugurated on 14 July 1903. For more on this railway construction, see Roine Viklund. \textit{Riksgränsbanans elektrifiering : stat och företag i samverkan: 1910–1917}, Diss. Luleå: Luleå tekniska univ., 2012. Luleå: Luleå tekniska universitet, 2012; Frank, Eklund & Berggren, see n. 9: 28f, 39f; Schön, \textit{En modern svensk ekonomisk historia : tillväxt och omvandling under två sekel}, see n. 95: pp. 123–126, 155–162.

and the iron ore, and it was to be achieved by scientific means. A research station, such as the one he imagined, would offer scientific explorers and researchers shelter from the harsh weather outside.

However, being a geologist rather than an astronomer or physicist, he did not mention anything explicit about studying the aurora. It was the glaciers and the mountain climate more than anything else that seemed to lure his interest. Even so, this process of site selection is noteworthy considering that this station, which he connected with the study of glaciers and mountains, was a forerunner to the observatory intended for studies in space physics. The latter would be a kind of descendant to the former even though they had different focus. It is relevant to point this out because of how Kiruna would evolve into becoming associated with space studies rather than any other scientific enterprise. What makes this even more important is that later in the twentieth century the continued interest in the glaciers and mountains would be not only running in parallel with the space activities, but also, to some extent, become integrated with them. Thus, it is relevant to make a connection between these early ambitions in the natural sciences, even though they may appear to have nothing to do with space science or technology.98

As pointed out earlier, the Swedish scientific interest between the 1850s and the first decade of the 1900s was largely aimed at the islands in the Spitsbergen archipelago north of the Norwegian coast. However, when the Swedish-Norwegian union was dissolved in 1905, Sweden no longer had any diplomatic value for doing research there, and Norway took over the role as the principal explorer of the islands. As a result, Swedish polar research diminished greatly after this. Of particular relevance to this dissertation is what this meant for the geographical aspects, something that the historian of science and ideas Urban Wråkberg described as follows:

One of many consequences of this decline of Swedish polar research in the early 20th century was that Swedish geophysical scientists had to restrict their collection of observational field data geographically to what could be measured within Sweden and adjust the topics of their research accordingly.99

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98 For a more thorough analysis of the site selection of the research station, see Sörlin, Framtidslandet: debatten om Norrland och naturresurserna under det industriella genombrottet, see n. 53: 140ff.

99 Urban Wråkberg. "Where science turns into sports and politics: the decline of Swedish
In other words, Swedish geophysicists could at the time only practice observations within the territorial boundaries of the country, which meant the land area to the east of Norway and west of Finland—the space that until now had been practically ignored by them. It was almost as if their perspectives were funnelling down from the greater Arctic region to the smaller area that makes up the north of Sweden.

**Research stations in the ‘Old World’**

In 1902–1903, Svenonius set up a permanent research station about 127 kilometres west of Kiruna by Vassijaure Lake, near the recently constructed iron ore railway that passed through Kiruna and Narvik (see map in Figure 1.3 and photograph in Figure 2.2). At the time, this part of Sweden was still largely unexplored terrain, and in the protocol from a 1902 meeting with the Stockholm Natural Science Society, which was the initial coordinating body of the station, the area was referred to as ‘the northern part of the Old World’. Because of the station’s location near Vassijaure Lake, which connects to the larger Torneträsk Lake, it became known as the Vassijaure Natural Science Station.

The research at the station encompassed several scientific fields, including zoology, botanics, terrestrial hydrography, geology, geophysics, and meteorology, where meteorology included studies of the auroras. Regarding the opportunity to observe the auroras, Svenonius wrote in 1905, ‘In several aspects, the location is considered ideal for an Arctic meteorological hinterland station. In no other place in our country should it be more feasible to study polar research in the early 20th century’, in: *Center on the periphery: historical aspects of 20th-century Swedish physics*, ed. by Thomas Kaiserfeld, Marika Hedin & Svante Lindqvist. Canton, Mass.: Science History Publications, 1993: p. 97.


the auroras, the föhn winds, the avalanches, etc.\textsuperscript{102} For the context of the present study, it is not necessary to go into more detail about the scientific activities at the research station other than to point out that both kites and balloons were used to allow for better observations of the atmosphere.\textsuperscript{103} The next chapter will make a connection with these technologies.

When the Vassijaure station started having reoccurring problems with insufficient resources, which affected the ability to maintain scientific studies, it was decided the research activities would be relocated to a more suitable location by Torneträsk Lake further east.\textsuperscript{104} However, on 29 December 1910, the Vassijaure station burned down and the research activities temporarily moved to one of the buildings owned by the Swedish Tourist Association (Svenska Turistföreningen).\textsuperscript{105}

An interesting observation is that the Vassijaure station was partly funded by district judge Knut Tillberg (1860–1940) and the mining company LKAB through its General Manager Hjalmar Lundbohm (1855–1926). Lundbohm was also part of the committee that coordinated the station.\textsuperscript{106} This is an


\textsuperscript{106}Utdrag ur protokoll hållna vid sammanträden med Stockholms Naturvetenskapliga Förening, 6 december 1912. Fo1:1, Ämnesordnade handlingar 1908—1934. Vassijaure/Abisko Natur-
example of how scientific activities could have connections with the local industry.

In 1912, the scientific activities were moved to Abisko between Torneträsk Lake and the railway, about thirty kilometres east of the former Vassijaure station (see Figure 2.3). Over the next few years, the research at this new

vetenskapliga station. Centrum för Vetenskapshistoria, Kungl. Vetenskapsakademien, Stockholm (henceforth cited as KVA-Abisko5); KVA-Abisko1, see n. 104.

In addition to these stations, the geologist Axel Hamberg (1863–1933) started in 1910 to establish five smaller research cabins in the Sarek area some 135 kilometres south of Vassijaure and Abisko. Much like Svenonius, he frequently visited Lapland and made important contributions by mapping and studying the landscape. However, unlike the stations in Vassijaure and Abisko, the research at his cabins did not have auroral studies on the agenda. Carl Gustaf Bernhard. Abisko Scientific Research Station, Stockholm: Informationsavdelningen, Vetenskapsakademien, 1989: 6f; Sörlin, Framtidslandet : debatten om Norrland och naturresurserna under det industriella genombrottet, see n. 53: pp. 142–145; Hans Wilhelmsson Ahlmann. ’Axel Hamberg’, in: Svenskt biografiskt lexikon, ed. by Bertil Boëthius, Bengt Hildebrand & Göran Nilzén. Stockholm: Svenskt biografiskt lexikon, 1918—.
station, known as the Abisko Natural Scientific Station, would increasingly be focused on meteorological and geophysical observations.

Figure 2.3: Abisko Natural Scientific Station was erected by the mountain pass known as the Gate to Lapland (Lapporten). Photograph by Oscar Halldin (1873–1948). Source: Abisko Naturvetenskapliga Station, fotograf av Oscar Halldin, c. 1919–1934. F01:3, Åmnesordnade handlingar 1908—1934. Vassijaure/Abisko Naturvetenskapliga station. Centrum för Vetenskapshistoria, Kungl. Vetenskapsakademien, Stockholm (henceforth cited as KVA-Abisko6)

In 1919, the scientific work at the station was divided into two departments, one for geophysics and one for biology and geology. This split would have implications for the later developments of geophysics and the emergence of so-called geocosmophysics or cosmic geophysics, which concerned studies of the near space around the earth. Ten years later, in 1929, most of the meteorological observations, except those of biological relevance, were relocated to the meteorological observatory that the Swedish Meteorological-Hydrological Service (Statens meteorologisk-hydrografiska anstalt) (SMHA) had set up in 1929 at Riksgränsen next to Vassijaure by the Norwegian border.¹⁰⁸ Riksgränsen was thought to be better suited for meteorological observations.

In 1933, the Abisko station including all buildings, instruments, and other material were taken over by the Royal Swedish Academy of Sciences. However, a number of circumstances made it difficult to maintain continuous measurements, something that was of utmost importance. One reason was the Second World War. Another was difficulties in finding new scientific staff because not many people had the necessary scientific expertise in magnetism.\(^{109}\)

**The problem with Abisko and Riksgränsen**

Slettenmark’s recommendation

Because of these problems at the Abisko station, the director-general of the SMHA, Gustaf Slettenmark (1884–1963), requested on 24 September 1943 the engineer Gösta Malm (1873–1965), who at the time had been appointed by the government to investigate the reorganization of the SMHA, to consider in particular the stations in Abisko and Riksgränsen.\(^{110}\)

Besides being deeply involved with the SMHA investigation, Malm also had prior experience with some central governmental investigations relating to research and higher education.\(^{111}\) In the 1940s, there was a lot going on in Swedish research politics with many governmental investigations relating to

\(^{109}\)In the early 1940s, it was often the caretaker who did the scientific observations while also looking after the station. *Kungl. Svenska vetenskapsakademiens årsbok för år 1943*, Stockholm: Almquist and Wiksell, 1943: p. 133; *Kungl. Svenska vetenskapsakademiens årsbok för år 1944*, Stockholm: Almquist and Wiksell, 1944: p. 137; *Kungl. Svenska vetenskapsakademiens årsbok för år 1945*, Stockholm: Almquist and Wiksell, 1945: p. 149.

\(^{110}\)See also Malm, *Betänkande med utredning och förslag angående organisationen av Statens meteorologisk-hydrografiska anstalt*, see n. 108: Appendix 1:1; SMHA was formed in 1918. For more on its origin and context, see Eriksson, *Kartläggarna: naturvetenskapens tillväxt och tillämpningar i det industriella genombrottets Sverige 1870-1914 = [The growth and application of science in Sweden in the early industrial era, 1870-1914]*, see n. 94: p. 45.

research and higher education. Malm was in charge of several of these commissions. One of the most important outcomes of them was the setting up in 1942 of the Swedish Technical Research Council (Tekniska Forskningsrådet), which served as a model for several other research councils formed after the Second World War.\textsuperscript{112}

In his memo to Malm in September 1943, Slettenmark explained the problem at Abisko and suggested a solution. The core of the problem was the way the staff were organised. At that time, the scientific officer at the station had to possess specific skills in geophysics as well as in magnetism and seismology. This combination made the number of potential candidates practically non-existent. However, the new magnetic observatory on Lovö Island in Stockholm, set up in 1928 by the Geological Survey of Sweden, together with the existing magnetic observatories in Tromsö, Norway, and Sodankylä, Finland, meant the need for magnetic observations in Abisko had changed somewhat so that only relatively basic observations, without data processing, should be required. Similarly, the processing step could be removed from the seismological analysis so that the officer could focus on the registration of the data.

The processing of the data could instead be done by the corresponding responsible institutions. For the magnetic data, the geomagnetic section at the Royal Swedish Nautical Chart Department (Kungliga Sjökarteverket) would do the processing, and for the seismological data, the Royal Swedish Academy of Sciences would delegate the tasks to the right person. With these changes, it would be possible to have an officer trained in physics or meteorology who could spend rather little time on the observations. In other words, now the costs for such a post would be relatively low, and it would be easier to find a person to fill it.

Slettenmark also recommended that the meteorological observatory at Riksgränsen be moved to Abisko. One reason for this was that the weather conditions at Riksgränsen were often not very favourable for doing meteoro-

logical observations in the upper layers of the atmosphere. Such a transfer of the observatory would require either that the existing building at Abisko would be refurbished or that a new building would be built to accommodate the new observatory.\textsuperscript{113}

**Formation of the Abisko Committee**

Malm, however, did not consider himself to have sufficient expertise to carry out this investigation and, therefore, he recommended in his January 1944 report to the government that the matter should be handed over to the Royal Swedish Academy of Sciences, the Royal Swedish Nautical Chart Department, and the SMHA. He included Slettenmark's memo in his report.\textsuperscript{114}

Later the same year, on 14 September 1944, the government appointed these very same bodies to look into the matter. They formed the Abisko Committee (Abiskokommittén) to carry out the investigation.\textsuperscript{115} Some of the members would turn out to be of more central relevance in the continued work to establish a new observatory in Kiruna. The Chair of the Abisko Committee was Rolf Sievert who can be described as the most central and active governor—the spider in the web—in the early strivings to set up the new Kiruna observatory. Another central character in this regard was the geodesic Nils Ambolt (1900–1969). Over the next decade, Ambolt would work

\textsuperscript{113}SOU 1947:6. Betänkande med förslag till geofysiskt observatorium i Kiruna m. m. P. 17.

\textsuperscript{114}Malm, *Betänkande med utredning och förslag angående organisationen av Statens meteorologisk-hydrografiska anstalt*, see n. 108: 81f, 121; In Sweden, the policy process consists of several stages that together might take several years to complete. First, the government or a government agency appoints a commission to investigate the problem and make recommendations. Such a commission typically consists of a mixture of politicians and experts. When they are finished with the investigation, usually after a few years, they deliver their proposal to various authorities and other interest groups for comments. Next, the commission will include both the investigation and the comments in a report to the government. After that, the government will draft a bill for consideration in the parliament. Finally, the parliament will make a decision based on the bill and submit this recommendation to the administration, which will come up with detailed recommendations. For more on this Swedish policy process, see e.g. Olof Ruin. *Sweden in the 1970s: Policy-making becomes more difficult*, in: *Policy styles in Western Europe*, ed. by Jeremy John Richardson. London: Allen & Unwin, 1982, pp. 141–167: esp. 141f; Thomas J Anton. ‘Policy-making and political culture in Sweden’, in: *Scandinavian Political Studies*, 4.A4 (1969), pp. 88–102: esp. 93ff.

\textsuperscript{115}See n. 109: p. 151.
as Sievert’s ‘right-hand man’ and the two have been acclaimed for having made the greatest contributions in realising the plans for the Kiruna observatory.¹¹⁶ The physicist and later Nobel Prize winner Hannes Alfvén (1908–1995) was one of the most influential persons in the science of the auroras. Another person who would turn out to have a central role for the formation of geophysics in Kiruna was the physicist Harald Norinder (1888–1969).

Several members of the Abisko Committee undertook a study trip to Abisko in the summer of 1946, in connection with a geophysics conference that was held there. This was a great opportunity to discuss the plans of a new observatory, in particular since there were participants who had experiences setting up observatories in Norway, Finland, and Denmark (Greenland) (Figure 2.4).¹¹⁷

When the commission had finished its work, a report was submitted on 10 January 1947 to the government who published it as the Official Government Report SOU 1947:6, Betänkande med förslag till geofysiskt observatorium i Kiruna m. m. (Report with proposal for a geophysical observatory in Kiruna, etc.). In accordance with the traditional Swedish policy process, the report included written statements from several bodies that had reviewed the proposal.¹¹⁸ The following section will analyse these in more detail.

The Gothenburg connection and other referrals

Several bodies had reviewed Malm’s investigation of the smha, which included Slettenmark’s memo, and replied with comments. Here I will only provide those standpoints that I consider particularly noteworthy. The radio technologist Olof Rydbeck (1911–1999), at the Institute of Tele-Technology and Electronics (Institutionen för teleteknik och elektronik) at the Chalmers University of Technology (Chalmers Tekniska Högskola) (CTH), pointed out how his team was already doing ionospheric observations and ‘for a long time’ had been planning to start complementary ionospheric observations in the Kiruna region.¹¹⁹

¹¹⁶Hultqvist, Space, science and me, see n. 57: p. 42.
¹¹⁷SOU 1947:6, see n. 113: 9f; Bernhard, see n. 107: p. 11.
¹¹⁸SOU 1947:6, see n. 113.
The background to Rydbeck’s interest in the Swedish north had to do with radio communication science and how radio waves propagate in the outer atmosphere. In 1943, Rydbeck had set up a wave propagation observatory in Stora Askim outside Gothenburg on the west coast of Sweden. He also wanted to set up ionospheric observations in the auroral zone in the north of Sweden. In addition, his institute sent an expedition to the north of Sweden to do ionospheric observations during the total solar eclipse that would occur on 9 July 1945. The expedition was placed in the village of Sörmjöle, some
twenty-two kilometres south of the town of Umeå on the east coast.\textsuperscript{120}

Rydbeck’s motivation to do observations specifically in the Kiruna area was connected with the auroral zone. Ionospheric storms and auroras caused rapid changes in the upper atmosphere. By using new instruments donated by the Carnegie Institution in Washington, USA, Rydbeck hoped to work out a new method to measure these rapid changes. Such measurements would be of great important both to geophysics and solar physics. He had received a lot of support for these plans when discussing them with other geophysicists and ionosphere scientists at the International Union of Radio Science meeting in Paris in 1946.\textsuperscript{121}

Following a meeting between Rydbeck, Nils Ambolt and Rolf Sievert, the Institute of Tele-Technology and Electronics delegated one of its assistants, the technologist Rune Lindquist (1922–1980), to survey the Kiruna area where the new observatory was meant to be set up. Lindquist checked for interferences that could affect the ionospheric measurements and then submitted a report to the Institute. The team later discussed which site would be the most appropriate. They decided on a place in Kauppinen, some eight kilometres east of the town of Kiruna (Figure 2.5).\textsuperscript{122}


\textsuperscript{121}Rydbeck, Femtio år som rymdforskare och ingenjörsutbildare : från skånska horisonter till fjärran galaxer, see n. 120: 413,419ff.

\textsuperscript{122}In the document written by Sievert, it was Rune Lindquist who was sent to survey the sites, but according to another assistant Bo Stjernberg (1936–2014), it was he who undertook this survey. Both of them worked under Rydbeck, so it is possible both of them went up north. Stjernberg said the visited places were (distances relative to Kiruna town): Abisko (100 km northwest), Rensjön (25 km northwest), Pajala (150 km east-southeast), and Jukkasjärvi (15 km east). Olof Rydbeck, Förslag från Chalmers tekniska högskola rörande det planerade
Another reviewing body that also emphasized the relevance of studying how the ionized layers in the upper atmosphere affect the propagation of radio waves was the Royal Swedish Academy of Sciences. In addition to these ionized layers, the Academy found it important to study the cosmic radiation, an area that was also of relevance to meteorology. Both of these phenomena were associated with the region close to the poles of the earth.\footnote{123}

Hannes Alfvén, who was a co-opted member of the Abisko Committee...
but also represented the Royal Institute of Technology (Kungliga Tekniska Högskolan) in Stockholm, pointed out that because geophysics was one of the most neglected scientific fields in Sweden, there was a great need for a geophysical observatory. In particular, he stressed how the observatory’s geographic location within the auroral zone made it suitable for auroral and geomagnetic observations of events such as magnetic storms. He also brought up that it would be useful to make the new observatory part of a network of observatories close to the auroral zone, such as the neighbouring ones in Tromsø, Norway, and Sodankylä, Finland. The observatory’s location was also of particular relevance for studying the cosmic background radiation, the thermal radiation believed to be a remnant from the cosmological event known as the Big Bang.\textsuperscript{124} At these high geomagnetic latitudes in Abisko, the magnetic field could not shield the earth from even the weakest part of this radiation. A new observatory in Abisko could, therefore, complement the background radiation measurements in Stockholm. There was also interest in studying the ionosphere, although Alfvén was not sure if such observations were motivated considering that the Tromsø observatory was already doing that.\textsuperscript{125}

The ionosphere was also of interest to the director-general of the Swedish Telecommunications Administration (Televerket), Håkan Sterky (1900–1992). According to him, the Administration found it relevant to study the connection between air ionization and auroral lights, as well as the connection between geomagnetism and electrical earth currents and the geological conditions of the area. However, the Administration was already doing such observations and consequently was not entirely dependent on a new observatory in Abisko.\textsuperscript{126} Yet another proponent of studies concerning the ionosphere and cosmic radiation was the physicist and oceanographer Hans Pettersson (1888–1966) who represented the Oceanographic Institute in Gothenburg (Oceanografiska instituteet i Göteborg).

The last of the referrals that deserves explicit mention is the one from the Stockholm Observatory (Stockholms Observatorium). The astronomer

\textsuperscript{125}SOU 1947:6, see n. 113: 21f.
\textsuperscript{126}Ibid.: p. 22.
Bertil Lindblad (1895–1965) reported that it would be of great importance to have a refurbished station in Abisko that could also consider astronomical interests. At the time, the Stockholm Observatory was planning to undertake astronomical studies in the mountains in the far north of Sweden where the sun never set during the midsummer period and where the atmospheric conditions made solar observations potentially more feasible. He also referred to other reasons to perform astronomical studies there.\(^\text{127}\)

To sum up these referrals, it is obvious that there was a lot of national scientific interest in doing ionospheric observations, not least with regard to how radio waves propagate, but also with regard to the auroral lights. Other important phenomena were geomagnetic variations and cosmic radiation. The Kiruna region, including Abisko and Riksgränsen, played a significant role for all these different physical properties. This particular place offered advantages that the south of Sweden did not have. It seems the north of Sweden was the obvious, natural place not only for studying glaciers, föhn winds, and other aspects typical for the mountain region, but also for doing these types of space-related observations.

**Cosmic geophysics**

The second half of the Abisko Committee’s report was dedicated to their proposed solution. Here, they wrote about their view on a number of topics, including the discipline of geophysics and its different constituents, the need for a northern Swedish research institution, the location for the new geophysical observatory, and a number of other aspects of an organizational, financial, and administrative kind. The first three will be analysed in more detail.

The Abisko Committee devoted part of the report to clarifying what was meant with the term *geophysics*. Geophysics could be seen as a special branch of physics that concerned the observation and interpretation of phenomena that occur in or on the earth, including its shells of water and air. Based on the different states of aggregation of matter (i.e. solid, fluid, and gas), it was possible to divide geophysics into three main areas, each with its own subdivisions: the physics of the solid earth, the physics of the sea and the inland

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\(^{127}\)SOU 1947:6, see n. 113: p. 23.
waters, and the physics of the atmosphere, also known as meteorology. The Committee went into more detail about the last of these, the one concerning meteorology. Research in this field had recognized physical processes in those layers of the atmosphere that are between the surface of the earth and the auroral zone. Typically, these areas were of interest to weather forecasting and climate studies. A particularly noteworthy part is what the Committee said about the layers above these:

On the other hand, the electro-physics of the highest layers of the air, including phenomena such as the auroras, the penetrating radiation and the ionosphere, have increasingly fallen outside the regular research tasks of meteorology and are now considered belonging to other parts of geophysics.\(^{128}\)

What this means is that they saw the ionosphere and auroras as a space outside the field of study that is dealt with in meteorology.\(^{129}\) This boundary-making is relevant in order to understand which scientific fields would be recognized at the new observatory. Both Riksgränsen and Abisko had been rather undefined with regard to which sciences were being studied there, and this went back to Svenonius’ days when he talked about ‘just about all branches of the natural sciences’.\(^{130}\) To use the metaphor again, it is as if the scientific interest was funnelling in on a very specific part of the atmosphere.

This new, fourth area of geophysics did not quite fit in with the three common states of matter.\(^{131}\) In addition, this way of categorizing was not entirely accurate because phenomena that belong to one aspect of geophysics

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\(^{131}\)There are additional states of matter, but the three most common are solid state, liquid state, and gas state.
can affect other aspects. Instead, it was based on the causal connection that the new area was defined. Thus, because the electrical phenomena in the upper atmosphere were caused by outer space, the new area of geophysics was called *cosmic geophysics*.

With regard to organization, the Abisko Committee advised that the planned Kiruna observatory should be joined together with the research stations in Abisko and the research huts in Sarek into a body subordinated to the Royal Swedish Academy of Sciences through a board. An exception would be a special department for meteorological observations, which would be subordinated to the Swedish Meteorological-Hydrological Institute (Sveriges meteorologiska och hydrologiska institut) (SMHI), the new name of the SMHA.132

**PROPOSING A RESEARCH INSTITUTION**

The Abisko Committee detailed a number of advantages of placing the observatory in the north of Sweden as opposed to placing it elsewhere. The first reason they brought up was the foreign interest of a new observatory. Sweden could become an important part of the international scientific community in geophysics. Next came motivations connected with the geographical location:

In comparison to other countries, Sweden is, like to some extent the neighbouring countries Norway and Finland, unique by having an area north of the polar circle with relatively mild climate and easy access. Corresponding areas in Asia and America have a rather harsh climate and bad communications. Greenland and Svalbard are difficult to reach, Iceland is almost completely south of the polar circle. The northern parts of Norway and Finland do not have as good communications as the north of Sweden. In no other country is it possible to travel comfortably by rail for a whole day from the central parts of the country, where universities and colleges exist, and reach places north of the polar circle, where research of this kind is favourably undertaken.133

132 The SMHA had been renamed into the SMHI in 1945. SOU 1947:6, see n. 113: 36ff, 57f.
133 Original quotation: ‘Sverige intager liksom i viss mån även grannländerna Norge och Finland i jämförelse med övriga länder en särställning genom att området norr om polcirkeln här har ett jämförelsevis mildt klimat och är lättillgängligt. Motsvarande områden i Asien och Amerika hava ett synnerligen hårt klimat och dåliga kommunikationer. Grönland och Spetsbergen äro svårtillgängliga, Island ligger praktiskt taget helt söder om polcirkeln. De nordliga delarna av Norge och Finland ha icke lika goda kommunikationer som Nordsverige. I intet land kan man såsom i Sverige efter ett dygns bekväm järnvägsresa från landets centrala
In the quotation above, the Committee shows how Sweden stands out among the countries with land areas in the polar region. The point is not whether the description was accurate; instead, the interesting aspect is how they articulated certain qualities of the north that make it stand out. They did this by combining the geography, the climate, and the nature with social aspects such as communications. Also implied is the location of the Swedish north in the auroral zone. The description would not work as well for a place in the south of Sweden. Even if the south has better communications, it is not inside the polar circle, which is a prerequisite to have a good chance of seeing the auroras. The end result, all things combined, is something unique. So far, the place-making aspect is not so much a matter of making the population centre of Kiruna into a specific place, but rather making the north of Sweden a specific region. It is specific, and yet it is relatively undefined with regard to borders. They talk of the north without specifying what it means. But it is something more than just the geographical north; it is also where the connection with the vertical space has a special role.

In addition, the Abisko Committee stressed the practical benefits of doing continuous observations and measurements of meteorological, seismological, and magnetic phenomena. For example, the need for meteorological observations were becoming increasingly important for flight traffic planning, and research in climatology was essential for making more reliable snow storm alerts, which were needed to keep the trade routes through the mountains secure.\(^{34}\)

Based on these motivations, the Committee proposed the establishment of a research institution of a larger scale than the existing station in Abisko. In connection with this, they also argued that the matter of education in geophysics in Sweden should be discussed. The new institution could be organized in such a way as to provide education for students and younger researchers from all over the country, and as such, it was of a national interest.\(^{35}\)

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\(^{34}\)Ibid.: p. 28.

\(^{35}\)Ibid.: 28f.
Site selection

Given that the Royal Swedish Academy of Sciences already disposed of the Abisko station and a large area of land around it, there was much in favour of selecting that specific place for the new observatory. However, after measuring the effect of the railway power lines on the geomagnetic and ionospheric measurements, they found that there was enough interference to cause problems. As a result, they considered an alternative site for the new observatory other than at Abisko.\(^{136}\)

The need to set up the observatory elsewhere was further motivated based on problematic meteorological measurements. It had turned out that meteorological observations at the existing observatories at Riksgränsen and Abisko were ‘heavily affected’ by the local weather conditions in the mountains and, therefore, not appropriate as indicators of the weather of the region that the observatories represented.\(^{137}\) Therefore, it was desirable to place the new observatory at such a location to avoid as much as possible interference from the local conditions, which meant away from the high mountains.\(^{138}\)

With these new restrictions in mind, the Committee wrote as follows:

The investigations to find an appropriate place for a geophysical observatory suggest that an area about 8 km east of Kiruna satisfies those demands that from different perspectives are considered necessary for the site of such an institution in the Swedish north. Tests that have been carried out, […], have shown that neither Riksgränsbanan [the iron ore railway] or the Kiruna industries different railway systems here cause any measurable interference on the magnetic registrations.\(^{139}\)

Here, the ‘investigations’ referred to the survey that the Institute of Tele-Technology and Electronics at the СТН had done and that was mentioned above. This new site, near a small village called Kauppinen that was relatively

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\(^{136}\) SOU 1947:6, see n. 113: 29f.


\(^{138}\) Ibid.: p. 30.

close to the population centre of Kiruna, was still sufficiently isolated to make observations without interference from Kiruna or the railway. At the same time, it was close enough to Kiruna to allow for easy transport by rail or road and close enough to a power line to allow for electricity without a risk for interference. The site itself, about two by ten kilometres in size, also offered advantages:

On the site there is a 6–8 m tall hill, on whose crown can be placed a mast for meteorological observations. Moreover, there is a small lake, which is of value to some studies. The vicinity to the mountain Aptasvaara (617 m a.s.l.), which raises about 200 m above the surrounding terrain, is of benefit for astronomical observations, so that the setting up of such observations, interfering ground fogs can generally be avoided and a favourable horizontal line to the north can be maintained.140

This quotation illustrates quite well my research question of how the idea to better understand the near space around earth has transformed material installations and space-oriented activities. Before the CTH sent their surveyor to this site, it was a place not yet intended for space activities. The sources do not reveal much about what was there, other than the land being a so-called kronopark, a forest area owned by the Swedish State. But my point is that, from the moment the surveyor first had a look at the area, and with Rydbeck looking at the plans, and the Abisko Committee making further decisions, the site was gradually made into a place for space-activities. This transformation was more tangible through the descriptions of the hill as a place for a mast and the mountain as a place for astronomical observations. The landscape played a very central and active role in this site-selection process.

Another matter that was debated concerned the accommodation. It was expensive to equip the research stations to allow for the staff to live there. This could be solved by placing the new observatory near a population centre so the staff could live in regular flats or houses rather than at the station. Even so, the Abisko Committee decided that the new observatory would have a flat

140 Original quotation: ‘Inom området reser sig en 6–8 m hög kulle, å vars krön en mast för meteorologiska observationer lämpligen kan placeras. Vidare finnes en mindre sjö, något som för vissa undersökningar är av värde. Närheten till berget Aptasvaara (617 m ö. h.), som höjer sig omkring 200 m över den omgivande terrängen, är till fördel för astronomiska observationer, enå de genom en förläggning dit av dylika observationer störande markdimmor i allmänhet kunna undvikas och en gynnsam horisontlinje i norr erhålls’, ibid.: p. 31.
for the caretaker and additional sleeping and working rooms for night staff and guests. In addition, the observatory would include a kitchen, a library, and a sauna.\footnote{SOU 1947:6, see n. 113: 31,45f.}

However, this was only the Abisko Committee’s recommendation for a new observatory. The report had to be decided on by the Swedish Parliament, and it was still possible that the decision would be made to keep the observation activities at Abisko. Regarding the Abisko station, the Committee stated that it would be better suited, due to its vicinity to the mountains, for botanic and zoological research. As for the station in Riksgränsen, the Committee recommended it should continue to be a weather station.

**Askim’s northern sister observatory**

**Kiruna Town gets involved**

On 10 January 1947, the Abisko Committee handed over their report to the Government. But, despite the Government’s interest in a new observatory, the financial situation would cause it to take almost a decade until 1956 before the Government took action and decided to grant money for the construction of the new observatory. Meanwhile, the \textit{cth} group under Olof Rydbeck was eager to proceed with their measurements. This was urgent because during this time, around 1948, the solar activity cycle, which is eleven years, was at its maximum. This allowed for excellent opportunities to perform observations relating to solar storms, ionospheric activities, and the like.

Based on a recommendation from the botanist Rudolf Florin (1894–1965), who was anxious to refurbish the Abisko station for the upcoming botanist congress in 1950, as well as the physicist Erik Hulthén (1891–1972) and Rolf Sievert, both of whom had been part of the Abisko Committee, the Royal Swedish Academy of Sciences decided on 28 April 1948 to form the Interim Board for Natural Scientific Research in the Swedish North (Interimsstyrelsen för Vetenskapsakademiens Forskningsstationer i Övre Norrland).\footnote{The Swedish term \textit{Norrland} refers to one of the three largest districts in Sweden. It is the largest and northernmost of all three. Each of these districts in turn consist of a number of counties. \textit{Övre Norrland} usually refers to the two northernmost counties, Norrbotten County and Västerbotten County.} Sievert,
who continued to be dedicated in his work to establish an observatory in Kiruna, was appointed Chair, while Hulthén, Florin, and Hilding Köhler were appointed members, and Carl Johan Östman secretary. Köhler and Östman had both been part of the Abisko Committee, so this new Interim Board was a rather close-knit group. Later, the astronomer Bertil Lindblad also became a member. He had written one of the referrals to the Abisko Committee. As this suggests, many of these members were recurrent in the strivings to establish the new observatory. 143 The primary tasks of this board would be to coordinate and facilitate those scientists who wished to do research in the north of Sweden, while also continuing to refurbish the Abisko Natural Scientific Station. 144

It should be emphasized here that Kiruna town went through a number of administrative transformations during the 20th century. Prior to 1948, Kiruna was part of a so-called rural district and from 1 January 1948, it was organized as Kiruna Town (Kiruna Stad), a form of municipality. In 1971, it was reorganized again into its present-day form of Kiruna Municipality (Kiruna Kommun).

With regard to funding, in addition to receiving a grant of 50,000 Swedish kronor from the Swedish Natural Research Council (Naturvetenskapliga Forskningsrådet), Sievert had written to the Kiruna Town Treasury (Drätselkammaren) about his plans to set up temporary facilities in the Kaupinen area about eight kilometres east of Kiruna that the Abisko Committee had recommended. 145 The Treasury decided on the matter on 8 March 1948. For each of

the two years 1948 and 1949, Rydbeck would have 10,000 Swedish kronor at his disposal for this purpose. The Treasury provided two barracks and two smaller buildings that were set up in the summer of 1948.146

For the first time, Kiruna Town became involved as a body contributing to the space activities. This was a crucial step of relevance to the process of making Kiruna a space town. Much like in 1912, when it was the mining company’s general manager Hjalmar Lundbohm who, together with the district judge Knut Tillberg, acted as local authorities when supporting the setting up of the Abisko station, this time it was the formal body of Kiruna Town that provided part of the funding for the new Kiruna observatory.

This latter support had consequences beyond the mere financial aspects. By supporting the new observatory, the authority’s name—Kiruna town (Kirunastad)—became more intimately associated with the space-related research. Now it was not only a matter of the site and its geographical location but also of the funding supporter. Kiruna Town would never finance such activities if they did not believe they would gain something in return. I suggest they could imagine many advantages with this, and it is probable that Sievert or someone else from the Interim Board with the gift of speech had talked to members from the Kiruna Town Treasury about these advantages. The sources do not reveal much about such negotiations behind the scenes, but Sievert did post a memo to the town treasury on 13 September 1948. The one and a half page memo listed seven advantages for Kiruna to have the planned observatory. A few of these will be highlighted; the first is quoted in its entirety:

No other cultural land has an area north of the Polar Circle, in which a well planned town is situated and where fast and comfortable railroad connections from the capital exist. One can therefore presume that a great number of scientists, both Swedish and foreign, will station their research at the planned observatory. This will provide for increased opportunities for cultural exchange, which, among other things, should be expressed through popular scientific lectures and demonstrations of the facilities for scientific research.147

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146 See n. 143: p. 167.
147 Original quotation: ‘Inget annat kulturland har ett område norr om polcirkeln, i vilket en väl planerad stad är belägen och dä stanna och bekväma järnvägsförbindelser från huvudstaden finnas. Man kan därför förutsätta, att ett stort antal vetenskapsmän, både svenska
Of particular relevance in this quotation is the notion that the *town* becomes connected to the scientific research. Sievert imagined that the scientific observatory together with the infrastructure would contribute to making the town into a thriving cultural and scientific centre. This paragraph alone says a great deal about how space-oriented activities and material installations would contribute to the notion of Kiruna as a place for science.

Sievert also brought up other important advantages following the first one detailed above. One was the potential need for new tourist hotels. Nordic and international geophysical conferences would be arranged in Kiruna, and this would lead to a great number of visiting scientists. Third, junior academics could also function as teachers at the upper secondary school. And conversely, the great need for temporary mechanics and assistants in the workshops, laboratories, and in the field work could open up for internships or first employments for the students. With regard to higher education, if a professor in geophysics would become director of the observatory, which was likely, it would improve the opportunities for higher academic studies in Kiruna. Yet another advantage with establishing a new geophysical observatory in Kiruna was that it was likely to lead also to an astronomical observatory being set up in the area.

Taken together, all of these arguments Sievert used to convince the town treasury contain, I argue, an immanent connection between the town of Kiruna and the space activities. This becomes even more clear through his seventh and final motivation: ‘With a new observatory in Kiruna, the town will become an internationally renowned place and a centre for northern Swedish research in natural science’.

Notice here how he envisioned Kiruna as a future knowledge centre. Although it is not clear from his arguments, I find it reasonable that he had an idea that there would be additional scientific

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148 Original quotation: ‘Genom ett observatorium i Kiruna kommer staden att bliva en internationellt välkänd ort och ett centrum för nordsvensk naturvetenskaplig forskning’, KK-Allm20, see n. 147.
activities in Kiruna once the new observatory was in place.

**TEMPORARY BARACKS NEAR KAUPPINEN**

Rydbeck’s team started the automatic measurements at the temporary observatory in 1948, shortly after the antenna was erected and the panoramic ionosphere recorder was installed (Figure 2.6). Of relevance to the idea of Kiruna as a space town is the following colourful description written by Rydbeck. In this passage, he recalls the nature both in the Abisko area near the Gate to Lapland and in the area by the new observatory, close to Laxforsen by Jukkasjärvi:

> We ran a few tests with this [panoramic recorder] during the summer, when I learned to appreciate the Laplandish nature, to drink coffee with the lapps [Saami people] on the train to Kiruna, to see the Gate to Lapland rise in the West and to go fly fishing in Laxforsen or even in Rostojaure Lake. What I missed most of all when we shut down the activities in 1956 […] was the nature. I did not think it would be so difficult for a Southern Swede to leave Lapland.150

Here, Rydbeck expressed an aspect that, so far, has not been made sufficiently explicit in the source material that has been analysed: the contact between high technology and advanced science on the one hand, and the sublime nature and traditional lifestyle on the other hand. After working at his laboratory in Gothenburg, it was a completely different kind of nature and

149 Rune Lindquist. ‘A survey of recent ionospheric measurements at the Ionospheric and radio wave propagation observatory at Kiruna,’ in: *Arkiv för geofysik*, 1.11 (1951), pp. 247–266; Olof E. H. Rydbeck. ‘The Ionospheric and Radio Wave Propagation Observatory at Kiruna, 67° 50’ N, 20° 14.5’ E,’ in: *Tellus*, 1.4 (1949), pp. 60–64; For a more thorough overview of the different buildings, instruments and experiments, see the annals of the Royal Swedish Academy of Sciences during this period, e.g. see n. 143.

150 Original quotation: ‘Vi gjorde en rad prov med denna [panoram] under sommaren, då jag lärde mig att uppskatta den lappländska naturen, att dricka kaffe med lapparna på tåget till Kiruna, att se lapp-porten stiga upp i väster och att flygiska öring i Laxforsen eller rent av i Rostojaure. Vad jag saknade mest […] det var naturen. Jag trodde inte det skulle vara så svårt för en skåning att lämna lappmarken.’ Today, the term *Saami* (or the different spelling *Sami*) is used instead of *lapp*, which is seen by many as derogative. Rydbeck, *Femtio år som rymdforskare och ingenjörsutbildare : från skånska horisonten till fjärran galaxer*, see n. 120: p. 478.
surrounding that met him outside. This is something that has to be taken into account when considering how Kiruna became a place for advanced space research, technology, and other space-related activities. Sweden is a country with rather varied topography and different climate zones, with varying flora and fauna, with varying concentrations of population, and with slightly varying lifestyles and cultures, and these differ between the south and the north.

Another important aspect to consider is the way the developments were recognized by the mass media. In the autumn of 1948, an article in the national newspaper *Svenska Dagbladet* reported on the new radio astronomy department at the CTH, and also mentioned the new observatory in Kiruna:

This [ionospheric] observatory [south of Gothenburg] is in close contact with the newly established cosmogeophysical observatory in Kiruna, which has received buildings by Kiruna Town[ […] A similar station with that kind of modern equipment, as the Swedish Natural Research Council has arranged
for Kiruna, does not exist north of the Polar Circle.\textsuperscript{151}

This might be one of the very earliest newspaper articles that refer to Kiruna in connection with space-related research. In describing the activities at the station, the newspaper also used a subheading ‘The velocity of “falling stars” is studied’, which referred to the method to track meteors as a by-product of capturing the auroras on film.\textsuperscript{152} The falling stars were just a by-product, but the newspaper chose to make that a headline probably because it would appeal more to its readers. Perhaps more people knew what falling stars meant compared to those who knew what northern lights meant.

In other words, by using such an eye-catching headline while talking about the scientific activities in Kiruna, the newspaper contributed to a large degree to make the public think of Kiruna as a place for studying the stars and the northern lights. This might well be, if not the first, at least one of the earliest sightings in the press of making Kiruna associated with space activities. Because of the new observatory, Kiruna was now a place where falling stars could be studied. The public was likely quite unaware of most of what has been covered above, including the Abisko Committee, but even a small newspaper article such as this might have caught the eyes of many readers.

While the site and its research activities took shape, there were important organisational changes of relevance to the new observatory. The Royal Swedish Academy of Sciences suggested on 9 January 1952 that the Government appoint a board for the scientific research stations in Northern Norrland and issue regulations for this board. The Government approved of the request on 29 February, and on the same day the Interim Board was succeeded by the Board for the Royal Swedish Academy of Sciences’ research stations in Northern Norrland (Styrelsen för vetenskapsakademiens forskningsstationer i Övre Norrland), henceforth referred to as the Board for the Academy’s research stations, or just the Board. These stations were the Abisko Natural


\textsuperscript{152}Original quotation: “Stjärnfallens” hastighet studeras’, SvD-1948-10-15, see n. 151.
Scientific Station, the KGO, Sarek’s natural scientific buildings, and the Tarfala Valley glaciological observatory.\textsuperscript{153}

Rickard Sandler (1884–1964), a former prime minister of Sweden who also had been Chair of the Interim Board and as such a very influential person, was appointed to the Chair position once again. Among the other members, the Royal Swedish Academy of Sciences was represented by Erik Hulthén, Rudolf Florin, Hilding Köhler, Hannes Alfvén, and the zoologist Bertil Hanström (1891–1969). The SMHI appointed Carl Johan Östman, and the Royal Swedish Nautical Chart Department appointed Nils Ambolt. The fourth scientific body, the Swedish Natural Research Council, was represented by Bertil Lindblad and Rolf Sievert. Once again, it was by and large the same solid group of people who had been involved since the beginning in governing the plans for the observatory. All the while, Sievert was perhaps the most influential driving force of them all.\textsuperscript{154}

The Government granted in January 1953 a total of 2215 hectares (22 square kilometres) of crown land area by the Luossajoki stream to the Academy intended for the new observatory. The Board for the Academy’s research stations appealed to The National Board of Public Building (Kungliga Byggnadsstyrelsen) that it was urgent to complete the observatory in time for the IGY 1957–1958. As a result, the National Board of Public Building appointed an architect, who after consulting with Rolf Sievert, presented in early 1954 a proposal for the new observatory.\textsuperscript{155}

In the spring of 1954, Sandler, representing the Board for the Academy’s research stations, wrote a petition to the Kiruna Town Treasury requesting financial support to cover both the construction of new buildings for the KGO and the operations of the observatory. For a ten-year period starting, and including, 1955, Sandler asked for an annual grant of 40,000 Swedish kronor, or the same amount that Kiruna Town had granted to the petition

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{154}Ibid.: p. 172.
\end{enumerate}
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from the Interim Board on 18 November 1948. The town treasury granted the request on the 24 May ‘provided that the planned construction would be carried out.’\textsuperscript{156}

The total costs for the new observatory was estimated to be 1,550,000 Swedish kronor and the annual costs about 149,000 Swedish kronor. In addition to the grants from the town treasury, the Board for the Academy’s research stations also received a grant from the Academy itself in the form of a one-time sum of 250,000 Swedish kronor. The rest of the costs would be covered by the Government, although the Government had not yet decided on the matter. Once the funding could be secured, the Board aimed to have the new observatory formally started by 1 July 1957, on the same date as the opening of the IGY.\textsuperscript{157}

**International Geophysical Year**

On 28 October 1952, the Swedish National Committee for Geodesy and Geophysics (Svenska Nationalkommittén för Geodesi och Geofysik) appointed a commission to prepare for the upcoming IGY. This commission surveyed the suggestions for Swedish activities and also collaborated with corresponding bodies in Iceland, Norway, Finland, and Denmark regarding regional activities. The proposed Swedish scientific program included a meteorological and oceanographic program, exploration of the ionosphere and the space outside earth (‘geocosmophysics’), measurements of weight, and observations of lightning over the northern polar region.

Over the five fiscal years starting with 1954/55 and ending with 1958/59, the Swedish Parliament would grant a total of 900,000 Swedish kronor to the National Committee for Geodesy and Geophysics for organizing the Swedish participation in the IGY. Part of this money was meant for the continued establishment of the KGO, although the first such grants were not approved until the 1955 Parliament.


When the National Committee for Geodesy and Geophysics asked for funds in 1954, it referred to an investigation regarding the planned Swedish participation in the IGY. This investigation motivated the need to set up a global network of stations for making observations in geodesy and geophysics. While this network was well established in Europe and parts of America and Asia, it was still incomplete in other parts, including the polar regions. One purpose of the IGY was, therefore, to fill these geographically ‘empty’ spaces in the network.\textsuperscript{158}

Regarding the specific Swedish projects, they were, according to the National Committee for Geodesy and Geophysics, categorised as either meteorology or cosmic physics. The cosmic physics program would focus on the connection between the electrically charged layers of the atmosphere. Because the IGY was planned for 1957–1958, this coincided with a peak in the cycle of solar storms, which would be of particular interest to study.\textsuperscript{159}

A working program was set up to implement these projects. The National Committee for Geodesy and Geophysics only commented on a few aspects, such as the expedition to Spitsbergen, the Swedish observatory for solar research on the island of Capri in Italy, and a range of observations within Sweden.\textsuperscript{160} Of particular relevance to this study is the last of these, the one concerning observations, where three tasks were brought up. The first observation task concerned extended registration of cosmic radiation, where instruments would be placed in Kiruna as well as either in Stockholm or Uppsala. Both the second and third tasks concerned ionospheric measurements. One was proposed by the Research Institute of the Swedish National Defence (Försvarets Forskningsanstalt) and concerned ionospheric measurements in Östersund just south of the auroral zone. The other ionospheric task consisted of five different subtasks, all proposed by Olof Rydbeck on behalf of the Institute of Tele-Technology and Electronics at the CTH. Two of his tasks were related to the continued construction of the Kiruna observatory.\textsuperscript{161}

\textsuperscript{159} Ibid.: p. 713.
\textsuperscript{160} The Swedish observatory on Capri was founded by the astrophysicist Yngve Öhman (1903–1988). See Holmberg, ‘Yngve Öhman, utbyteszonerna och svensk solforskning under efterkrigstiden’, see n. 43.
\textsuperscript{161} Kungl. Maj:ts Proposition 1955:1, see n. 158: p. 715.
The Swedish program would change somewhat over the years. To mention just one example, in the petition for the fiscal year 1957/58, the National Committee for Geodesy and Geophysics wanted to add observations of northern lights using a special camera designed by the German-Swedish engineer Willy Stoffregen (1909–1987). With this camera, which became known as the all-sky camera, it was possible to take pictures of the entire sky each minute during the dark hours of the night. By using several such cameras in a network, and by taking simultaneous photographs, it was possible to get much more accurate observations of the northern lights. The international community had already recognized the camera and ordered several of them to be set up for the IGY.

What I especially want to call attention to in the above description of Sweden’s and Kiruna’s role in the IGY is that, just like with the first and second IPYs of 1882–1883 and 1932–1933, it was a matter of whether Sweden and Kiruna represented a geographic location in a network. Unlike the first IPY, when mainland Sweden did not have any research stations, this time Sweden would have a new geophysical observatory. In other words, Kiruna was now on the map in a more concrete way than before (Kiruna as a town did not even exist during the first IPY). The space on the map had been replaced by a particular place. Also, unlike the first IPY, this third installation was to a much larger extent a global rather than just a polar collaboration.

Inauguration of the Kiruna Geophysical Observatory

On 1 July 1957, the new buildings were finally inaugurated (Figure 2.7 and Figure 2.8). Some 100 guests attending, including both national and international officials and scientists as well as members of the mass media. The Board for the Academy’s research stations was represented by Rolf Sievert (Rickard Sandler was ill) who handed over the observatory to the Royal Swedish Academy of Sciences. Another person present at the ceremony was the physicist Bengt Hultqvist (b. 1927), who was the first director of the KGO from 1956 until 1994 (Figure 2.9).

The inauguration was opened by the Governor of Norrbotten County, Manfred Näslund (1899–1988). In his speech, he put the new observatory as one in a line of historical milestones that included Carl von Linnaeus’ explorations and the scientific stations in Vassijaure and Abisko. He also talked about a regional scientific centre: ‘We would like to see the geophysical observatory in Kaupinen as an embryo to a scientifically rich research centre in Norrbotten County.’ Of course, in his capacity as the governor of the region, it was his duty to visualise and encourage the potential of the region at large rather than focusing specifically on Kiruna. There were other regional developments of relevance to this event. Above all, there was an ongoing government investigation of new universities and university colleges.

in Sweden. At the time, Uppsala University (Uppsala Universitet) was the northernmost university and there were talks of constructing a university somewhere further north.

It is interesting to note how Näslund’s optimistic idea of a regional knowledge centre illustrates a fundamental aspect of what I like to refer to as the place-making process more broadly. Because the new observatory had become reality, and with it the scientific research activities that centred mostly around the northern lights and the near space around earth, Näslund made the connection between this and the ongoing investigation about a potential northern university. Together, the two—the observatory and the envisioned university—would form a regional centre. In connection with the earlier research on how places of knowledge are formed, it is interesting to note this idea of a regional centre rather than the town itself as a place for knowledge.

On the topic of a regional university, another speaker, the Minister of Education Ragnar Edenman (1914–1998) assured: ‘The northerners should not be under the illusion that they will get a university out of romantic northern Swedish reasons.’ Instead, he talked more broadly about the potential of the space studies. Based on the source material, he appears to have been the only one who explicitly made the connection between Kiruna’s traditional industry—the iron ore mining—and the new potentials of space science: ‘The iron ore may run out in 200 years, but the northern lights and the earth’s magnetism will persist.’

The geographic location was also something that the astronomer Bertil Lindblad referred to when he stressed how ‘the Kiruna observatory has and will have, because of its location, a great importance internationally.’ He also talked about the new frontiers of scientific discovery:

The era of great geographic discoveries has passed. Therefore, it is a scientific


Figure 2.8: A 1972 map of the KGO area, with the E10 Europa road passing through in the east-west direction. The main building from Figure 2.7 is marked as building number 1. Notice also the old observatory, which is building number 2, about 500 metres east of the new observatory. Source: Vetenskapsakademien: betänkande med förslag om institutionernas framtida ställning m.m., Stockholm: Utbildningsdepartementet, 1972: p. 133
The young Bengt Hultqvist became an important driving force in the emergence of Kiruna’s space activities from the 1950s onwards. Here he is at the KGO conversing with the former prime minister and two senior scientists who had been part of the Abisko Committee and were key figures in the making of the KGO. From left: Nils Ambolt, Bengt Hultqvist, Harald Norinder, and (sitting) Rickard Sandler. Photo from 1958. Source: Bengt Hultqvist. *Space, science and me: Memoirs on Swedish space research during the post-war period*, ESA Special Publication, 2003: p. 28 (Courtesy of Torbjörn Lövgren)
task of utmost importance to explore the physical processes that take place inside our earth. The location of this observatory at a high latitude makes it, with regard to some investigations, especially suited to give results of great importance.\textsuperscript{168}

According to this newspaper, Lindblad appears to have talked about the geophysics of the \textit{inside} of the earth. In that case, he presumably referred to the geomagnetic processes. However, the other major regional newspaper reported him talking about physical processes on earth and in the atmosphere, i.e. processes \textit{outside} the earth.

Another speaker who talked of the new observatory in a wider perspective was the renowned American physicist Lloyd Berkner (1905–1967), President of the International Council of Scientific Unions and a Fellow of the American Academy of Arts and Sciences, who said the new observatory was an expression of humankind’s aspiration to know more about the planet we live on.\textsuperscript{169}

Other sources have reported that scientists at the time made a point of the isolated geographic location of Kiruna. For example, when Hultqvist wrote in his memoirs about his move from Stockholm to Kiruna in order to become the first Director of the KGO, he recalled how Willy Stoffregen, who had designed the all-sky camera for the IGY, reacted with scepticism telling him that ‘it was sheer madness to believe that it would be possible to conduct successful research in the long run in such an isolated location as that in which the Kiruna observatory was being built’.\textsuperscript{170} A similar remark has been found by the historian of science Gustav Holmberg, who has studied the astrophysicist Yngve Öhman’s work on solar research. When Öhman heard about the new observatory being situated in Kiruna he allegedly said it had been ‘placed in a boring and what I understand to be an unhealthy region’.\textsuperscript{171}

\begin{footnotesize}
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\item \textsuperscript{169} NF-1957-07-04, see n. 166.
\item \textsuperscript{170} Hultqvist, \textit{Space, science and me}, see n. 57: p. 31.
\item \textsuperscript{171} Translation from secondary source: ‘då den placerats i en tråkig och efter vad jag förstår
\end{itemize}
\end{footnotesize}
these comments, they may have contributed to some preconceptions about Kiruna and the northern Swedish region as being a place that stood out in relation to the rest of Sweden and the world at large. A more explicit example of such preconceptions were brought up in one of the regional newspapers that, under the sub-heading ‘Kiruna inhabitants uncivilised?’ claimed that the people living in Kiruna had been offended by a radio broadcast from the inauguration where the radio reporter had begun by asking how it was possible that the observatory was placed so far from civilisation.\(^{172}\)

The fact that the inauguration was on the front pages of the regional newspapers suggests that, at least regionally, it was considered important. Headlines such as ‘Red-letter day in Kiruna for research’ and ‘Dollar rains over the Kiruna observatory’ suggest both the solemnity and the international relevance of the event.\(^{173}\)

To sum up, this inauguration was, perhaps more than anything before, the moment when the idea of Kiruna as a place for science was projected to the public. It might be that many Swedes were already familiar with the recent scientific activities in the area, but to the broader masses I suggest it was rather unknown until the mass media started reporting from the ceremony. Because not many national newspapers covered this event, it is reasonable to assume that the event must have had a greater impact on the regional level.

**Conclusions**

The setting up of the kgo just outside central Kiruna was part of a sequence of events that started with the establishment of the first research stations in Vassijaure and Abisko, both in the larger Kiruna area. These two earlier research stations were the first permanent research stations in the larger Kiruna area that engaged in studies of the near space around the earth. However,

\(^{172}\)Original quotation: ‘Kirunaborna ociviliserade?’, NSD-1957-07-03b, see n. 167.

Although there was this earlier tradition of geophysics research to build on, the establishment of the KGO was a milestone in making Kiruna known for scientific activities. For the first time, Kiruna had a setting fully dedicated to the scientific study of the near space around earth.

Previous studies have shown how knowledge centres have formed either in the near vicinity of existing population centres or spread out over larger areas. In the light of this research, an important observation is that the initial research stations at Vassijaure and Abisko were placed in the larger Kiruna region rather than inside, or even in proximity to, the town of Kiruna. In contrast, the KGO was established closer to the town, although still at a large enough distance from the town centre to be situated isolated enough to avoid electromagnetic interferences. However, the KGO was not isolated from the outside world. For example, it was intended to become part of the IGY, which was a network of similar observatories. Based on the early developments in Kiruna’s space activities, it is, however, too early to make any conclusions with regard to the spatial concentration and composition of the space-oriented activities and the physical structures connected with these.

In addition to the importance of the horizontal geography to Kiruna, the vertical geography also had a bearing. Already at Vassijaure, scientists experimented with kites and balloons to explore the vertical space above the earth. These ambitions to reach upward can be seen in contrast to the efforts to reach downwards into the iron ore mine. The upward expansion can be seen as a new form of frontier. I argue that this was relevant for the place-making in the sense that a new physical space was added to Kiruna’s pre-existing geographical ‘sphere’ that consisted of the horizontal and downward geography.

Another central matter is the arguments that were used to motivate for the space research and the new observatory to be placed in Kiruna. To start with, the main reason for the governmental investigation to be initiated was because of the organisational problems at Abisko. Related to this was the scientific argument that Kiruna was located at a latitude in the auroral zone. Other arguments included the need for geophysical studies to be done in

isolation, while also allowing for convenient infrastructure and logistics. As a result, the most suitable site was found some eight kilometres east of the town of Kiruna. At this site, the different requirements could be met, and there was a balance between being isolated and being in the vicinity of a population centre with relatively easy access.

With regard to the actors involved, this chapter has shown that it was the work of many actors and sets of actors that contributed to the setting up of the space activities. To begin with, the KGO was the result of both more spontaneous or ‘organic’ efforts, e.g. Svenonius’ first initiative with the Vassijaure station, and central planning, e.g. through the governmental investigation into the new observatory. Although individual persons were of great importance, it would be too trivial to attribute either one or all of them with establishing the space activities in Kiruna. Instead, it is important to also include the committees, organisations, and other groups that helped make the KGO possible. These include the Abisko Committee, the Royal Swedish Academy of Sciences, and Kiruna Town, but also the actors and sets of actors who indirectly funded or supported the work. This observation can be compared to previous research on places of knowledge that have attributed, and to some extent problematized, a single person as the founding ‘father’.175

To sum up, this chapter has shown how the geophysical science activities took shape in Kiruna during the first half of the twentieth century and how this development contributed to the setting up of the KGO in the vicinity of Kiruna. Although it can be argued that the KGO was not the first such scientific research station in the area, it marked the beginning of a more space-focused interest.

The focus of the present chapter has been on the scientific activities. The next chapter will continue the chronological narrative by focusing on how rocket technology became another fundamental activity in the Kiruna area.

175 One such person is the former dean of Stanford University, the American academician Frederick Terman (1900–1982), who has been referred to as the ‘father of Silicon Valley’. Margaret Pugh O’Mara. Cities of knowledge : Cold War science and the search for the next Silicon Valley, Princeton, NJ: Princeton University Press, 2004: p. 107; Kargon, Leslie & Schoenberger, see n. 17: p. 339; Bassi, see n. 8: 32f.
CHAPTER 3

MAKING PLACE FOR TECHNOLOGY: ESRANGE ROCKET BASE 1958–1966

On 4 October 1957, the Soviet Union launched its Sputnik 1 satellite into space, causing a shock wave throughout the Western world that had not expected the communist state to achieve such cutting edge technology so quickly.\(^{176}\) In particular, the United States was provoked and made an effort to catch up with the Soviet Union. These events were the beginning of what would later be referred to as the Space Race that became part of the Cold War between the two superpowers.\(^{177}\) Over the next months, the Soviet Union and the United States successfully launched additional satellites.


\(^{177}\) A clarification is in place here. Even though the term ‘space race’ usually refers to the events following the launch of the Sputnik by the Soviet Union and the American response to that, several countries—the Soviet Union, Germany, Great Britain, the United States, and others—had a history of space flight or rocket technology prior to 1957. Asif A Siddiqi. *The red rockets’ glare: spaceflight and the Soviet imagination, 1857-1957*, Cambridge, UK: Cambridge University Press, 2010: 16ff,121–124.
Several European countries, including Sweden, started to discuss plans for a European collaboration. Although this joint space effort took form in the context of the Cold War with its geopolitical implications, the Swedish representatives argued that Sweden, which had a long tradition as a neutral country, would only join the collaboration if it were of a civilian rather than military nature.

Specifically, the Swedish participation in the European space collaboration largely concerned the plans to set up a sounding rocket base in one of the geographic regions controlled by the member countries, where Kiruna was one of several proposed locations. Because of the ongoing Cold War tensions and the fact that some member countries of the European space collaboration were NATO members, the negotiations that involved neutral Sweden were both of a scientific and a geopolitical nature. In addition, the plans to set up the sounding rocket base were also political on a local and regional level. The large geographical area that was going to be used as a rocket field was also part of an area used by several indigenous Saami villages for their reindeer herding.

Also, the debates surrounding the new rocket technologies engaged several Swedish technology industries. Although the use of technology for space science experiments was not new, the introduction of rocket technologies was of a different magnitude and required a larger apparatus and work force compared to the other technologies.

Another central aspect is the notion of the rocket base as the latest addition in a sequence of events that started with the research stations in Vassijaure and Abisko, and became more pronounced with the KGO. In this context, different geographical aspects involved in the establishment of the new rocket base will be analysed. Much like the geographic location of the KGO in relation to the town of Kiruna was far from trivial, the same can be said about the location of the rocket base.

This chapter will show how and why Kiruna was chosen as a location for the European sounding rocket base, and the consequences this had on a local and regional level. The focus is on events taking place between 1958 and 1966, from the initial Swedish plans to join the European space collaboration to the inauguration of the Esrange rocket base. Because this development was part of a larger debate concerning Sweden's participation in the European
space collaboration, the chapter will start with some context on how Sweden became involved in this international collaboration, and the description will focus particularly on matters relating to the planned rocket launch site.

**BEFORE THE SPACE RACE**

**THE STATE OF RESEARCH POLITICS**

After the Second World War, Swedish politicians realised the importance of making science and technology the engine of sustainable economic progress. One of the most central matters concerned finding new ways to organise and finance research in science and technology, where the state would negotiate with representatives of scientific institutions and industry. There were a number of government investigations that led to the formation of new agencies and scientific research councils, for example, the one by Gösta Malm that led to the establishment of the KGO.

These sentiments were expressed not least through the Harpsund conference in 1954, named after the mansion where the meeting took place. Here, representatives of science met with members of the government. Among the scientists present in Harpsund were Alfvén, Lindblad, and the physicist and administrator Gösta Funke (1906–1991). Alfvén was going to play an influential role in the next decade’s space science. Funke had not been directly involved in the formation of the KGO. However, he was the secretary of several scientific research councils and would play an important role in the coming organisation of the space science and technology not just in a Swedish context but also internationally.

The Prime Minister Tage Erlander (1901–1985) described in his memoirs how he had taken the initiative for this conference because, as he put it, ‘I felt a great need to keep in touch with the active scientists to hear their opinion regarding the effect of our arrangements [the national build-up of science and research], but above all to hear what demands they now had.’ This shows how influential the scientists had become with the government, or as Erlander

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178 Original quotation: 'Jag kände ett stort behov av fortsatt kontakt med de aktiva forskarna för att höra deras mening om effekten av våra åtgärder men framför allt vilka krav som de nu hade' (Added emphasis.), Erlander, see n. 111: p. 29.
also put it: ‘The scientists did not come as beggars to the politicians’ table. They were all aware of the incredible role their sciences could play in the building of the future society.’

Erlander would have several other informal meetings with industry and organisations at the Harpsund mansion, and these meetings have since been referred to as the Spirit of Harpsund (Harpsundsandan). This was in the same model as the Spirit of Saltsjöbaden (Saltsjöbadsandan), named after an important meeting in 1938 in Saltsjöbaden where a labour market agreement was reached. In the Swedish language, the concept of the Spirit of Saltsjöbaden is still connected with mutual understanding and the willingness to cooperate. In a wider perspective, these ambitions were part of the Swedish welfare model that had started in the 1930s. Another event in the same vein was the renowned Rigoletto Conference a year later in Stockholm, where not only scientists and authorities were represented but also leaders from trade unions and industry.

This political spirit contributed to a mutual agreement among leading politicians, representatives from industry, labour organisations, and the defence sector. There was a broad agreement to maintain a strong national military defence, not least concerning the air force.

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180 Bragesjö, Elzinga & Kasperowski, see n. 179: 78f.


EALY INTERESTS IN ROCKETRY

Before the use of rockets for scientific purposes took off, there were other means to perform observations at high altitudes. Kites were important in meteorology from the eighteenth century, and from around the 1890s balloons became useful. Both of these technologies had been used at the Vassijaure Natural Science Station. Experiments using balloons would continue to be used at Esrange during the 1960s and even later.\(^{183}\)

Rocket technology, which had been used for different purposes for many centuries, took a new turn during the Second World War, both internationally and in Sweden.\(^{184}\) In Sweden, expertise and developments in rocketry could be found in specific governmental authorities, such as the Royal Air Force Material Administration (Flygförvaltningen) and the Defence Aeronautical Experimental Institute (Flygtekniska försöksanstalten) as well as industry, such as SAAB, LM Ericsson, ASEA, Volvo, and Bofors. Because of its dual-use characteristics, production of rocket technology for military and civilian use often went hand in hand.\(^{185}\)

In 1950, groups and societies from eight countries with interests in aeronautics gathered in Paris for the first annual International Astronautical Congress. Sweden was the only of the countries that did not yet have a space society or a space group, but because of a personal invitation the engineer Åke Hjertstrand (1916–1989) could participate. At the time, he was working at the Research Institute of the Swedish National Defence. The eight countries agreed to sign the International Astronautical Federation on 2 October 1950, but in order to continue participating in the formation of the federation, Sweden was required to set up a Swedish space society. As a result,

\(^{183}\)Årsredovisning för Svenska Rymdaktiebolaget Räkenskapsåret 2000. Rymdbolaget. 2001: p. 1; Hultqvist, Space, science and me, see n. 57: p. 56.


\(^{185}\)A Swedish pioneer in the use of rockets for aerial photography was the engineer Wilhelm Theodor Unge (1845–1915) who worked with the chemist and inventor Alfred Nobel (1833–1896) in the late nineteenth century. Lundin & Stenlås, see n. 182: p. 15; Ingemar A Skoog. 'The Alfred Nobel rocket camera. An early aerial photography attempt', in: Acta Astronautica, 66.3 (2010), pp. 624–635.
Hjertstrand and three other rocket enthusiasts formed the Swedish Society for Space Research (Svenska Sällskapet för Rymdforskning) two weeks later in Stockholm, and the following year it was renamed the Swedish Interplanetary Society (Svenska Interplanetariska Sällskapet). The purpose of the Swedish Interplanetary Society was ‘to strive for astronautics in its broadest meaning’ and ‘to study problems and prerequisites that must be analysed and controlled in order to perform operations outside the atmosphere of the earth.’ The Swedish Interplanetary Society later became an arena for people with an interest in astronautics, and soon had several hundred members.

By and large, this was the Swedish context when the Sputnik 1 satellite was launched and the Space Race started.

**IN THE WAKE OF THE SPUTNIK SHOCK**

**THE EUROPEAN REACTION**

The fact that the Soviet Union and the United States had successfully launched their Sputnik 1 and Explorer 1 satellites into orbit had caused the worldwide scientific community to react. Because these events happened in the middle of the Cold War, the international community realised the risks involved in the potential misuse of the new space technology. This was a major contributing factor to the United Nations (UN) setting up the United Nations Committee on the Peaceful Uses of Outer Space in 1958, with Sweden among its first member states.

Meanwhile, many of the leading scientific nations around the world would

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start initiatives to take up the new challenges involved in space technology and research. In 1958, for example, the Republic of China initiated a project with the objective to have a satellite in orbit by 1959, and in 1962 India organised its national space research. Some European countries, notably the United Kingdom, France, Italy, and West Germany, had developed national space programmes even earlier in the early post-war period. These nations used different arguments to put stake into their space programmes. The Cold War was one motivation. However, at least in Europe, these national efforts were rather limited compared to the programmes developed in the United States and the Soviet Union. Individual European nations simply could not compete with the super-powers.

Consequently, the European solution was to be found in international collaborative structures. In the post-war period there emerged a new structure for expensive large-scale developments in scientific research and technology. This new structure was a response to the increasing scientific and politico-economic transformations that had taken off during Second World War, above all in the United States, but also, as it turned out, in the Soviet Union. New technologies, such as advancements in rocket and satellite technology, had opened up new scientific disciplines like nuclear physics and cosmic geophysics. It was difficult for European governments to ignore these developments because there was the risk that Europe would fall behind the United States at the research frontier. For single European countries with little resources it was difficult to catch up.

The solution was to form a united European community with institutions and mechanisms that would control the destructive forces and thereby prevent another war from happening. This new integrating movement, which started in the years following the war, gave European leaders hope for the future, such as stronger national economies and a shared European identity. These efforts to integrate the European countries led to the establishment of the European Economic Community in 1958. In retrospect, this ambition has been described as the ‘saviour of Europe’ with regard to the development of

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191 Ibid.: 897f.
the European space collaboration.\textsuperscript{192}

In addition to the European Economic Community, a number of other more or less European collaborative structures were formed in the post-war period. Increased scientific ambitions meant correspondingly larger and more complex technologies for scientific experimentation, and as a result this meant more involvement of specialists in a variety of disciplines.\textsuperscript{193} Such ‘big science’ collaborations depended not only on technical integration but also on political and economic cooperation in order to secure the funds required to carry out these projects.\textsuperscript{194} One of the earliest and most important of these structures was the European Organization for Nuclear Research (CERN) that was formed in 1952.\textsuperscript{195}

The European Space Research Organisation (ESRO), which would be formally established in 1964, was yet another of these European organisations.\textsuperscript{196} The first ideas of this joint space organisation were discussed in the spring of 1959 by the French physicist Pierre Auger (1899–1993) and the Italian physicist Edoardo Amaldi (1908–1989), who both had been involved in the setting up of CERN.\textsuperscript{197}

\section*{The Swedish reaction}

As mentioned, there was in the post-war period a new attitude where science and technology were seen as the engine of societal development. The KGO was one of the institutions that were established as part of this new politics. A few months after the inauguration of the KGO, the Soviet success with Sputnik underpinned the Swedish need to organise a national programme for space

\textsuperscript{192}Zabusky, see n. 39: p. 5.


\textsuperscript{194}Zabusky, see n. 39: p. 6.

\textsuperscript{195}Other big science projects included the IYS and the IGY.

\textsuperscript{196}For more examples, see Krige, see n. 190: 898f.

research and technology.\textsuperscript{198}

On 14 March 1959, Sverker Åström (1915–2012), an official at the Ministry for Foreign Affairs, invited representatives of a number of central scientific authorities and institutions to discuss the consequences of the Swedish membership in the United Nations Committee on the Peaceful Uses of Outer Space.\textsuperscript{199}

After the meeting at the Ministry for Foreign Affairs, a committee was formally formed on the 6 May. It was first named the Research Councils’ Committee on Space Research (Forskningsrådens kommitté för rymdforskning) and later shortened to the Swedish Committee on Space Research (Svenska kommittén för rymdforskning). The group consisted of representatives of the Swedish Natural Research Council, the Swedish Technical Research Council, the Research Institute of the Swedish National Defence, and additional government authorities.\textsuperscript{200} Several of the members have been mentioned earlier, including Bertil Lindblad, Gösta Funke, Hannes Alfvén, Olof Rydbeck, Bengt Hultqvist, and Åke Hjertstrand. Four additional members are worthy of mention, including the meteorologist Bert Bolin (1925–2007) and the physicists Nicholai Herlofson (1916–2004), Lamek Hulthén (1909–1995), and Ernst-Åke Brunberg (b. 1922).

The purpose of the Committee was to encourage ‘natural scientific and technical experiments, which are done using high-altitude rockets or satellites, as well as preparations for and processing of such experiments.’\textsuperscript{201} More

\textsuperscript{198} Prior to the Sputnik, the Swedish government was not completely unaware of the recent progress in Soviet science and modernization. See e.g. Sverker Sörlin. \textit{Science, geopolitics and culture in the Polar region: Norden beyond borders}, Farnham: Ashgate, 2013; For a more detailed description of the initial Swedish space organisation, see Stiernstedt, \textit{Sweden in space: Swedish space activities 1959–1972}, see n. 57: pp. 13–16.


\textsuperscript{201} Original quotation: ‘naturvetenskapliga och tekniska undersökningar, som utförs med
specifically, the following areas of scientific activities were discussed at the Committee’s first meeting: direct satellite observations, meteorology, cosmic physics, astronomy, radio technological communications, rocket research, biological aspects, and medical questions. Of these, the Committee agreed to focus their interest primarily on the developments in direct satellite observations, meteorology, cosmic physics, and radio communications technology.

According to the archival documents, the motivations for Swedish space research were always centred around the civil ‘peaceful’ scientific interest. Although I have not found any concrete military arguments in the documents I have studied, it is interesting that the Swedish Defence was represented from the start in this constitutive phase through its research institute. Jan Stiernstedt (1925–2008), at the time working for the Ministry of Education and Culture, and later Director General of the Swedish Board for Space Activities, has commented on this in retrospect as follows:

> The FOA’s [Research Institute of the Swedish National Defence] large contribution was motivated by its interest in both rocket launchings and fundamental research in the field. The research institute’s focus at that time was broader that it is today, there was a relatively large amount of money and contributions to basic research without a direct military interest were regarded as a natural part of activity to develop knowledge in general.

Of course, he was rather biased on this matter and it is possible to argue both with and against him. The rocket technology was, like many other technologies, a double-edged sword that could be used for both military and civilian purposes. Consequently, a motivated matter concerns on what grounds representatives from military institutions were involved. In connection with what was mentioned earlier about the Spirit of Saltsjöbaden and the Swedish welfare model, it is easier to understand why a group such as the Swedish Committee on Space Research could have such a mixture of members; there was a consensus to collaborate across boundaries for the benefit of overall national Swedish progress. The historian Wilhelm Agrell has analysed a similar

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situation that occurred in the composition of the Swedish Atomic Committee, which had been formed in 1945, where representatives of science and the military collaborated to work on the ‘peaceful’ uses of nuclear power:

The connection between the military and civil interests was at this stage hardly problematic from a scientific or technological perspective. But they were sensitive in other aspects. The atom bomb was not uncontroversial, but above all the disagreements were about matters relating to secrecy. The scientists and the representatives of industry meant that the relevance of the research work should not have a too obvious military feature, because this could make it more difficult or even impossible to establish important contacts with the United States, where, essentially, all the know-how was gathered.\textsuperscript{203}

Regardless of what the true motivations were, it was a dual-use technology with potential military applications.

**SWEDEN AND THE EUROPEAN COOPERATION**

In the autumn of 1959, the Swedish Committee on Space Research began conferring on the plans for participating in a future European collaboration in space research. Funke was well known in the inner circles of CERN, and as such was an obvious spokesperson in talks with Auger and Amaldi. At a meeting with the Committee, Funke volunteered to inform Amaldi that Sweden would only participate in such a joint effort if it were organised by the United Nations’ UNESCO agency in order to maintain neutrality.\textsuperscript{204}

The ideas of the European collaboration were more thoroughly discussed at the first international Committee on Space Research symposium on 10–


15 January 1960 in Nice, France. This international Committee on Space Research had been established in 1958 by the International Council for Science. Sweden was represented by Ernst-Åke Brunberg, whose report to the Swedish Committee on Space Research touched upon the matter of rocket experiments in Sweden.\(^{205}\)

At the meeting in Nice, they also discussed whether it was appropriate to have a general European affiliation with NATO’s plans to set up civilian space research activities. During the Cold War, there were tensions between NATO and the Warsaw Pact. While Sweden remained neutral, the country was in the middle of these tensions; many of the NATO countries were situated west of the Baltic Sea and the Warsaw Pact countries to the east. Thus, the Baltic Sea region—including Sweden—was heavily militarized. Brunberg made it clear that Sweden would only join a completely apolitical and neutral organisation. Not long after, NATO decided not to include space research in its programme, as this would cause neutral states such as Sweden and Switzerland to be excluded from such collaborations.\(^{206}\)

When Brunberg informed his European colleagues of the Swedish national plans, both Auger and the British representative Harrie Massey (1908–1983) ‘became enthusiastic given the interesting measurements that are possible in the auroral zone and suggested the idea that a European launch site be set up in the north of Sweden.’\(^{207}\) It is possible that, by this time, the Swedish Committee had already held informal discussions about the opportunity to set up a rocket base somewhere in the north of Sweden, and Brunberg presented these plans to his European colleagues who then agreed it was a good idea.

Several topics were discussed in Nice with regard to the European collab-


\(^{207}\)Original quotation: ‘blevo entusiastiska med tanke på de intressanta mätningar som äro möjliga i norrskenzonen och framkastade tanken att en europeisk utskjutningsbas borde ordnas i norra Sverige’, RA-SVKOM5, see n. 205: p. 3.
oration, for example, the use of rockets in scientific experiments, and which geographic location would be ideal for such experiments. Rockets could reach higher altitudes compared to ground-based measurements, kites, and balloons and thereby could make scientific studies of the upper atmosphere much more feasible. As it would turn out, this matter of choosing the most suitable rocket technology was intimately tied to a number of factors such as what kinds of scientific experiments were desired and the selection of the site to launch the rockets.

At a meeting with the Swedish Committee on 9 February 1960, it appears it was not yet known where a Swedish rocket site would be, although they hoped to host some European activities situated in northern Sweden. Bengt Hultqvist proposed at the meeting that they investigate the opportunity to set up a rocket base near Kiruna. In addition, they discussed with the Swedish Air Force concerning the use of the military base in Vidsel. As far as I can tell, this was the first time the idea of a rocket base in Kiruna was made official.\textsuperscript{208}

With regard to the kind of experiments they were discussing, one example had been suggested by Willy Stoffregen, who had engineered the all-sky camera that became a success during the IGY. He had plans to measure the electron density in the atmosphere during heavy northern lights. Such experiments required the payload, which carried the measuring instruments, to be launched using rockets of a certain size.\textsuperscript{209}

The discussions regarding the European space cooperation continued in London on 28–29 April 1960 where one of the topics on the agenda concerned the desirability to launch equipment from ground sites. The alternatives that were brought up were a French military base in the Sahara, an Italian military

\textsuperscript{208} Protokoll nr. 4 fört vid Forskningsrådets kommitté för rymdforskning sammanträde, 1960-02-09. Al:1, Kommitténs protokoll och föredragningslister 1959–1962. Svenska kommittén för rymdforskning (SE/RA/420538). Riksarkivet, Stockholm (henceforth cited as RA-SVKOM7); Hultqvist wrote in his memoirs that it was sometime in the autumn or early winter 1959 at a meeting with the Swedish Committee that he first suggested Kiruna as a place for the rocket base, and that it was not until January that it was made official. Hultqvist, \textit{Space, science and me}, see n. 57: 11f.

launch site on Sardinia, and one or even two sites in the north of Scandinavia, where ‘Scandinavia was a blank spot on the map from an observational perspective.’\textsuperscript{210} It should be pointed out that the work to establish a launch site in Norway, what would later become the Andøya Rocket Range, started in the summer of 1960, only a few months after the plans of the Kiruna base started to form.\textsuperscript{211} Regarding the Swedish options, Brunberg presented the existing rocket base in Vidsel, but also the opportunity to offer an even larger rocket field in the Kiruna area, maybe in cooperation with Norway.\textsuperscript{212} Particularly interesting is that he also pointed out the importance of having access to a well-equipped geophysical observatory such as the one in Kiruna.\textsuperscript{213}

Here is the first time in the source material that someone expresses a rocket base in the Kiruna region in connection with the KGO. It had been discussed among the Swedish Committee members prior to the meeting. What is important here is not so much the exact time when the connection was made but rather that it happened at all. The KGO and its location in Kiruna was now \textit{made} into an argument to establish new space-related installations in the area.\textsuperscript{214} The KGO was not the only argument to establish a rocket base, but it was a strong and contributing one. However, there were at this time


\textsuperscript{212}According to the archival documents, Brunberg did not explicitly mention Vidsel but it can be inferred from the context and the developments at large.


\textsuperscript{214}The exact words that Brunberg used at the meeting are not known because the source material only contains his summary rather than a full transcript. But it is possible that there are other documents, for example in the archives of the European Space Agency, that provide more accurate details.
also other alternatives, including the military rocket base in Vidsel.

The potential collaboration with Norway that Brunberg referred to is also noteworthy. Norway, which had organized its space research committee in January 1960, was not explicitly mentioned as one of the alternatives for a European rocket base. However, the Norwegian report stated that, although their space research was limited to tracking satellites by means of optical and radio methods, they were considering the potential to use small rockets in connection with studies of the ionosphere.\(^{215}\)

The London meeting concluded with a number of resolutions for the future, one being the prioritization of the ionospheric research and the study of Arctic space phenomena near the geomagnetic pole. This resolution would obviously benefit the Swedish plans of setting up a new launch site in the north of Sweden.\(^{216}\) The fact that ionospheric research was considered particularly important in not only a Swedish but also a European context was of great relevance to Kiruna.

In order to facilitate the formation of a European space research organisation, Pierre Auger suggested that the involved countries should constitute a provisional European Space Research Group with powers to decide which states should be part of the venture. As it turned out, this was a rather complex process. First it was decided to set up a study group that would define more precisely how the cooperation would proceed with regard to, for example, which scientific and technical studies would be relevant. At a meeting in Paris on 24 June 1960, the European Space Research Study Group was constituted.\(^{217}\) With Lamek Hulthén as one of the three vice chairs, the European


\(^{217}\)After its French initials, Groupe d’Etudes Européen pour la Collaboration dans le Domaine

The Swedish Space Committee on Space Research requested governmental funding for the first time in August 1960.\footnote{Protokoll nr 7 fört vid Svenska kommitténs för rymdforskning sammanträde, 1960-08-18. AI:1, Kommitténs protokoll och föredragningslistor 1959–1962. Svenska kommittén för rymdforskning (SE/RA/420538). Riksarkivet, Stockholm (henceforth cited as RA-SVKOM12).} In the budget request, the Committee argued why Sweden should do space research. While the super-powers were motivated by not only scientific and technological but also military and political reasons, the Swedish interest was based solely on scientific and technological motivations. The scientific value was indisputable, but the technological and industrial benefits could also be great. Here, the Committee gave a few examples, such as the relevance of rocket technology for the miniaturisation of radio technology. It was also important that Sweden was active in the development of satellite technology, not least with regard to weather and communication satellites. The Committee found that there was sufficient motivation to support a Swedish programme based on relatively cheap rockets in connection with the ongoing research in fields such as meteorology, ionosphere physics, and cosmic physics.\footnote{Protokoll nr 7 fört vid Svenska kommitténs för rymdforskning sammanträde, 1960-08-18, Bilaga 4: Förslag, Svenska kommittén för rymdforskning beträffande anslag för budgetåret 1961/1962. AI:1, Kommitténs protokoll och föredragningslistor 1959–1962. Svenska kommittén för rymdforskning (SE/RA/420538). Riksarkivet, Stockholm (henceforth cited as RA-SVKOM13).}

A prerequisite to carry through with such rocket experiments was to have a launch site of adequate size and in an appropriate location. While a temporary solution was to use the Air Force test base in northern Sweden, a more permanent solution would be to arrange for a larger rocket base operated by the Committee itself. The Air Force test base was too small and too far away from the KGÖ, which seemed to be an excellent location for the planned activities. In addition, it was problematic from a security perspective to perform civilian experiments on the military test range. When the Committee argued for the new base to be located to Kiruna, they pointed out that Kiruna des Recherches Spatiales.
Town had already promised to support such plans. Additionally, the location would be of interest for the European space collaboration:

If a European organisation in space research is realised, Scandinavia will, because of its—from a scientific perspective—interesting location in the auroral zone, have great opportunities to accommodate part of the activities. In Sweden, a rocket field in connection with the KGO is close to ideal. It is apparent that such a development would be important for Swedish science and it would be especially of interest to northern Norrland economically, culturally, and socially.221

The Committee obviously wanted to suggest not just benefits for Sweden but for all of Scandinavia. It was around this time that the collaboration with Norway was being worked out. But the most important part of the quotation, in this context, is the reference to the auroral zone and the KGO. The auroral zone in itself was no longer the main reason to establish a rocket base in the north, but the auroral zone in combination with access to the KGO. It was reasoned that if one alone was not sufficient reason, the two combined ought to convince the government. This process of adding new layers of space-related activities or material installations to those already in place constitutes the core of the making of Kiruna as a space town.

To finance the continued work on planning the rocket base, the Committee requested 50,000 Swedish kronor for the fiscal year 1961/1962.222 For the rest of their work, such as their planning of the scientific projects and the membership in the European space organisation, they specified no sum.223

221 Original quotation: ‘Om en europeisk organisation inom rymdforskningen skulle komma till stånd har Skandinavien på grund av det ur vetenskaplig synpunkt sett intressanta läget i norrskenszonen stora möjligheter få en del av verksamheten förlagd till sitt område, varvid i Sverige ett skjutfält i anslutning till Kiruna Geofysiska Observatorium är nära idealiskt. Det är uppenbart att en sådan utveckling vore betydelsefull för svensk vetenskap och speciellt skulle ha intresse för Övre Norrland, såväl ekonomiskt som kulturellt och socialt,’ RA-SVKOM13, see n. 220.

222 The value of 1,000 Swedish kronor in 1961 corresponds to about 11,482 Swedish kronor or 888 GBP in 2015.

223 RA-SVKOM13, see n. 220.
The Jokkmokk experiments

As suggested in the request for grants by the Swedish Committee on Space Research, the national space activities were of a more urgent matter than the ongoing plans for a European collaboration. These discussions were to a large degree focused around the fact that Sweden did not have a civilian rocket base. There was a military test range for missile experiments in Vidsel, about 230 kilometres south of Kiruna, which could be used, and another military test range in Karlsborg in southern Sweden, although this latter base was never included in the discussions, probably (at least in part) because of its location outside the auroral zone. Consequently, at a meeting in February 1960, the Committee arranged with the Swedish Air Force to use its Vidsel test range for the scientific experiments.

The experiments were going to take place near the village of Nausta in the Jokkmokk area, some 170 kilometres south of Kiruna. This area was very sparsely populated with only about fifteen people living there, all of whom were evacuated prior to the launch. This was only a temporary exception because the field was normally used exclusively by the military. Two projects were planned, both part of the national research program. One concerned the study of the meteorological properties of the atmosphere by means of releasing dust cloud from rockets and observing the movements of these clouds. The second project was to measure the flow of protons in the atmosphere during intense solar storms by launching instruments that send the measurements by radio to the ground station. These phenomena were also known as noctilucent clouds because to an observer on the ground they appeared to be glowing. Because they only appear at northern latitudes, Sweden was an

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224 RA-SVKOM, see n. 208.
226 RA-SVKOM, see n. 208.
ideal place for studying them. In addition to these two projects, there were also additional experiments by different groups.

The first round of rocket experiments occurred in Naust in August 1961 (see Figure 3.1). These were followed in the summers of 1962–1964 by new rocket experiments, but this time in another location called Kronogård, also in the larger Jokkmokk area, about seventy kilometres south of Naust. The choice of Kronogård, which was just outside the Vidsel test range, had to do with causing minimal interruptions in the military rocket tests. The purpose of the Kronogård experiments was to study both the noctilucent clouds and proton and electron flows in connection with the so-called polar cap absorptions.

![Figure 3.1: Preparation to launch the first Swedish rocket ‘Plutnik’ in August 1961. Photograph by Rolf Ericsson (Courtesy of Rolf Ericsson)](image)

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Regarding the different actors involved, these experiments were not only the work of academic scientists but also dedicated engineers and even amateurs. For example, the Swedish Interplanetary Society that was mentioned earlier offered their junior members a chance to practice at the Kronogård experiments.\textsuperscript{230} This engineering spirit can be seen in a broader context. The development of technology was an important ingredient in the emergence of the Swedish modernity and the welfare system from the 1930s.\textsuperscript{231}

These rocket campaigns, in particular the first one in Nausta, caused a lot of media attention, with both national and regional Swedish newspapers reporting. This media interest should be considered in a broader context where the Nausta launches occurred just months after the Soviet cosmonaut Yuri Gagarin (1934–1968) had become the first human being to journey into outer space, and only days after another Soviet cosmonaut German Titov (1935–2000) returned from his space trip. In other words, space flight was a common theme in the news. Added to this hype was the fact that this was the first time that the media were allowed into the military test range area.\textsuperscript{232}

The national newspaper \textit{Dagens Nyheter} briefly mentioned plans to ‘start rocket launches from the vicinity of Kiruna’, and that the Swedish Committee on Space Research had surveyed ‘the place (near Jokkmokk)’.\textsuperscript{233} It might be debated whether the two places are in the vicinity of each other. Geographically, the present-day Kiruna and Jokkmokk municipalities are separated by Gällivare Municipality, which has an area of about 16,800 square kilometres, and the population centres Kiruna and Jokkmokk are approximately 140 kilometres apart with Naustav village even further away from Kiruna. Perhaps it could be just a question of the point of view from wider national—especially southern Swedish—perspective that the two locations are very close, but from

\textsuperscript{230}For a personal account, see Grahn, \textit{Jordnära rymd : min rymdhistoria}, see n. 57: pp. 37–64.
\textsuperscript{231}Moreover, technology was symbolically connected with masculinity and the curious spirit of the men that drove them to feel a need to control and conquer the machines. Ulf Mellström. \textit{Män och deras maskiner}, Nora: Nya Doxa, 1999: pp. 51–55; For a contrasting perspective on female engineers, see Berner, see n. 49: 28ff.
a regional or local perspective they are considerably far apart. The economic historian Madeleine Eriksson studied in her dissertation popular representations of northern Sweden, and she found that the area and its population were represented through processes that she describes as an internal kind of Orientalism. In reference to the postcolonial theorist Edward Said, she suggested that there were exaggerated differences between regional identities within Sweden, where Norrland was an ‘internal other’. She included in her analysis examples of how the newspaper *Dagens Nyheter* in general tended to portray the Norrland province and wrote, ‘editorials and ordinary news material more commonly discussed Norrland in an imprecise and categorical way’.

One could, of course, argue that the journalist had just made a small mistake, but the same style of writing is found in the journal *Industria*, published by the Swedish Employers’ Confederation (Sveriges Arbetsgivareförening), which started by saying how the ‘Nike-Cajun rockets took off from the Kiruna field’ even though they referred to the experiments in Nausta.

In the light of Eriksson’s analysis, I claim that these examples contributed to constructing what she refers to as the ‘othering’ of the Swedish north. But the really interesting aspect is that they connected this othering with the enterprise of space science and technology. Added to this were occasional, often subtle, references in the media to the ‘isolated’ nature and ‘wilderness’, far from the university environments in the big cities further south such as Uppsala, Stockholm, Gothenburg, and Lund.

Another aspect of the media interest concerns the relevance of the geographic location of Sweden and even more so the north of Sweden. One of the regional newspapers first noted that ‘Sweden had entered the space age’. It then quoted the scientific leader of the project, Bert Bolin, who talked about

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how the so-called noctilucent clouds ‘only appear at our latitudes. Therefore, the Swedish scientists have a chance to make an internationally important contribution in this field’. As is evident from this quotation, it was important to make it clear to the public that Sweden, and in particular the northern region, had an advantage of being situated at the right latitude for certain scientific investigations.

Nausta and Kronogård were only temporary solutions. Even before the first rocket was launched from Nausta, the Swedish Committee on Space Research was making plans for a new rocket base near Kiruna. However, because the Kiruna base was still on the drawing board, it was these locations in the Jokkmokk area that were chosen for the experiments. Part of the reason was that the Swedish Defence had the necessary facilities already in place there, but also because Jokkmokk was situated in the so-called auroral zone and as such was suitable for studies of the ionosphere and its phenomena.

**Investigating a New Rocket Base**

On 1 December 1960, the countries involved in the European collaboration signed an agreement to form a body called the Preparatory Commission to Study the Possibilities of European Collaboration in the Field of Space (COPERS). The eleven member countries were Belgium, Denmark, the Federal Republic of Germany, France, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the United Kingdom.

On 31 August 1961, the Swedish Committee on Space Research together with representatives from COPERS held a meeting at Malmfältens Folk High

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School (Malmfältens Folkhögskola) in Kiruna to inform of and get feedback regarding the plans to establish a sounding rocket base near Kiruna. Several authorities, organisations, businesses, members of the press, and individuals had been invited, overall about sixty people. Among those invited were groups with particular interests in the physical area where the launch site was planned to be set up, for example the Swedish Society for Nature Conservation (Svenska Naturskyddsföreningen), representatives of hunting and tourism groups, and some Saami representatives.

Lamek Hultén of the Committee informed the audience of the ongoing plans to organise European space research, which included among other things a proposal to establish a base for high-altitude rockets. He summed up the reasons why Kiruna would be the most appropriate place for such a base. First, he explained about the vicinity to a relatively large town with all the amenities and opportunities it would offer to make the staff who would be working at the base feel comfortable. Another argument was the vicinity to the modern airport and accessibility through roads, which enabled for daily communications with Stockholm. A third reason in favour of Kiruna was the large ‘uninhabited’ land area north of the town centre, where the launched rockets could fall down and their instruments could be collected. The last of these arguments was that the rocket base would be located near the already existing geophysical observatory, as this could provide a good starting point and a potential collaborator for the activities at the rocket base. As this report shows, the arguments given in favour of Kiruna were largely the same as those that the Committee had already used when informing the government. The contemporary archival documents and later articles, books, and other printed material would reuse these arguments when motivating

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why Kiruna was chosen as the site for the rocket base.

Hulthén’s second line of argument related to the potential economic and cultural benefits for the district to receive an investment worth over twelve million Swedish kronor and with an annual budget of around five million. In the long term, this would lead to more job opportunities and other profits such as a richer cultural environment and stronger connections to all of Europe.

Another important motivation was Kiruna and Sweden’s position in an international scientific community. Here, another of the Committee speakers, Gösta Funke, explained to the audience that international scientific collaboration was not something new, but rather an old tradition. Two concrete examples were brought up. One was the CERN laboratory in Geneva. Funke described it as an example of expensive big science, which was something a small country such as Sweden could only afford to share with other participants. There was a balance between being dependent on participating in large scientific projects and being able to afford such ventures. In order to remain at the cutting edge of the international scientific community, Sweden could not risk remaining outside such collaborations.242

The second example concerned the eighteenth century French-Swedish geodesic mission, led by the French astronomer Pierre de Maupertuis (1698–1759), to the Torne Valley on the present-day border between Sweden and Finland.243 Funke’s reference to this expedition is worth commenting on briefly. Historical scientists and explorers such as Maupertuis and Carl von Linnaeus have often been used to show a connection between the past and the present. Manfred Näsmlund, the Governor of Norrbotten County, had similarly referred to Linnaeus in his speech at the inauguration of the kgo. It is a way to emphasize the tradition of a geographic region. Torne Valley is in the same county as Kiruna—the Torne River starts at Torneträsk Lake and passes north of Kiruna, and then south-east to Torne where it meets with the Gulf of Bothnia. This French expedition was certainly not the only historical one in the region, and there had also been many visitors to the north of Norway and Finland, but Näsmlund and Funke chose these particular

242 RA-SVKOM19, see n. 240: 5f; NSD-1961-09-01, see n. 241.
explorations because of their geographic connection with Kiruna.

The third speaker at the meeting who also represented the Swedish Committee on Space Research was its secretary Ernst-Åke Brunberg who put forth some specific scientific arguments. The fact that Kiruna was situated in the northern polar region meant certain advantages because of how the magnetic fields converge around the poles. As a result, the northern polar region was particularly suited for observing the auroral lights, which were concentrated in a ring-shaped zone around the magnetic north. Another phenomenon of interest to scientists was the cosmic radiation, which was also easier to observe close to the polar region compared to near the equator. A rocket base in Kiruna would make it easier for the scientists to study both these and other phenomena. Brunberg emphasized that it was not a matter of launching satellites into space. Rather, it was sounding rockets that would reach up to a few hundred kilometres.\footnote{RA-SVKOM19, see n. 240: 6f.} Again, several of these scientific arguments have been mentioned earlier. However, it is likely that much of this was new to several of those who were present in Kiruna on this day to listen to the Committee.

When Hulthén, Funke, and Brunberg had finished speaking on behalf of the Committee, the floor was open to questions. The biggest concern was the security risks involved with having rocket debris falling down into the large designated area, and whether it would cause damage to flora and fauna, or even be of risk to human beings. Pierre Auger, who represented COPERS, ensured the audience that falling rocket debris would only cause damage to nature if rockets were loaded with large quantities of chemicals, which was not the case with research rockets of the kind planned for Kiruna. The commissioner of the Kiruna Town Treasury, Ragnar Malmström (1898–1982), asked whether there would be risks for the residential areas close to the impact area. Auger shared his experiences from rocket launches in the United States where even smaller areas had been designated for rocket launches without any recorded damage to nearby residential areas. Moreover, people in the area were warned via radio.\footnote{RA-SVKOM19, see n. 240: 8ff.}
**Saami or State land?**

Among those invited to this Kiruna meeting in August of 1961 were a number of landowners and some Saami representatives. One of those present was the Saami bailiff of the upper region of Norrbotten County, Erik Hedbäck (1905–1980). He expressed concern that 700 Saami people were dependent on their reindeer herding and that their security had to be guaranteed. He proposed that common camping sites in the area would be equipped with telephone connections, and as an alternative to evacuating the Saami, they could be provided with security shelters.

In a broader perspective, to the Saami this was yet another of a long history of intrusions on their lands. Kiruna is part of the larger Sapmi region, where the Saami have lived for many centuries. Their history has been marked by colonisation, oppression, racial discrimination, and other conflicts. Different layers of cultural maps—political, economic, religious, and linguistic, to mention a few—overlap and sometimes conflict with each other. In the post-war period, around the same time as the rocket base was planned, the Saami in the north of Sweden had to face problems such as large-scale forestry, mining, and the construction of hydroelectric power plants. Both the Saami and the Swedish state claimed to have rights over these lands. A common state practice was to compensate the Saami for the intrusion. Similarly, the planned rocket base would be situated in an area where four Saami villages were located, which meant the space research activities would interfere with

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246 The bailiff office represented the Government on a regional level and its purpose was to settle the conflicts with existed between nomadic reindeer herders and the residents. This bailiff was not necessarily a Saami but a state official. For more on these bailiffs or the contemporary political history of the Saami, see Patrik Lantto. *Tiden börjar på nytt: en analys av samernas etnopolitiska mobilisering i Sverige 1900–1950*, Diss. Umeå: Univ. Umeå: [Institutionen för nordiska språk, Univ.], 2000: 51ff.

247 RA-SVKOM19, see n. 240: p. 8.


Saami reindeer husbandry.\footnote{A Sami village is a legal entity. Its members are Sami people who live on reindeer herding. Each Sami village has its own land area. Lantto, \textit{Tiden börjar på nytt : en analys av samernas etnopolitiska mobilisering i Sverige 1900–1950}, see n. 246: p. 39.}

Several months before the August meeting, the Committee had contacted the Saami bailiff Hedbäck, asking him to discuss with the Saami the plans for the new rocket base.\footnote{Brev från Ernst-Åke Brunberg till Lappfogde E. Hedbäck, 1961-05-10. EI:4 Anslagshandlingar och korrespondens 1959–1962. Svenska kommittén för rymdforskning (SE/RA/420538). Riksarkivet, Stockholm (henceforth cited as RA-SVKOM21).} It seems, based on the archive material, that somewhere along the line, only the Saami villages became informed, while the National Association of Swedish Saami (Svenska Samernas Riksförbund) was left out. As a result, one of the leading Saami representatives, Lars Rensund (1901–1993), wrote a letter to Bengt Hultqvist in part to make a point of the Association not being invited:\footnote{Utdrag ur protokoll, fört vid sammanträde med styrelsen för Svenska Samernas Riksförbund (SSR) å Samernas Folkhögskola i Jokkmok den 11-12 september 1961. EI:4 Anslagshandlingar och korrespondens 1959–1962. Svenska kommittén för rymdforskning (SE/RA/420538). Riksarkivet, Stockholm (henceforth cited as RA-SVKOM22).}

> Among the stakeholders listed above [in the quoted invitation to the meeting], what had unfortunately been left out was the largest interest group in the area that is very dependent on the area for its industry, namely the reindeer herder practitioners. The reindeer herding stakeholders have not at all been mentioned, nor their organisation the National Association of Swedish Saami.\footnote{Original quotation: ‘Bland de uppräknade intressena här ovan saknas tyvärr områdets största intressent-grupp som är mycket beroende av området för sin näringsutövning, nämligen renskötsetuttövarna, renskötselintressena har inte alls blivit nämnda och inte heller deras organisation Svenska Samernas Riksförbund,’ Brev från Lars Rensund till Docent Bengt Hultqvist, 1961-11-08. EI:4 Anslagshandlingar och korrespondens 1959–1962. Svenska kommittén för rymdforskning (SE/RA/420538). Riksarkivet, Stockholm (henceforth cited as RA-SVKOM23).}

In his reply, Hultqvist apologized and explained that ‘nobody in the Swedish Committee of Space Research knew about your organisation.’\footnote{Original quotation: ‘ingen inom Svenska kommittén för rymdforskning kände till Eder organisation,’ Brev från Bengt Hultqvist till Herr Lars Rensund, 1961-11-15. EI:4 Anslagshandlingar och korrespondens 1959–1962. Svenska kommittén för rymdforskning (SE/RA/420538). Riksarkivet, Stockholm (henceforth cited as RA-SVKOM24).} As this failure in communication suggests, it is sometimes a very complex
process to plan for a new material installation in a larger area such as the one used for the rocket base.

Moreover, in connection with the Kiruna meeting on 31 August, it is worth commenting again on the military involvement. The Commander of the Kiruna Defence District (Kiruna Försvarsområdesbefälhavare), Tore Wigforss (1904–1968), participated at the meeting, where he expressed his concerns that the construction of roads in the rocket field was not desirable from a military perspective. It is also interesting that he asked the Swedish Committee of Space Research that ‘the continued development would be done in consultation with military authorities’. This suggests that the Swedish military had not been deeply involved in the plans. Also, after the meeting he wrote to the Commanding General of the 6th Military Command (Militärbefälhavaren för VI. militärområdet) about the aspects concerning the rocket base that he considered of military importance. This letter further suggests that the Swedish military had very little interests in the rocket activities as such. Instead, it was a matter of keeping the strategically important area north of Kiruna as untouched as possible.

It is also interesting to note what the newspapers reported from this Kiruna meeting. In its report, the regional newspaper Norrbottens-Kuriren described the rocket base as a ‘Swedish Cape Canaveral’. This was the first time that Kiruna, at least to some degree, was given a name modelled on a place associated with space activities. Cape Canaveral is a cape in Brevard County, Florida. In 1950, the US Government had designated it as a test station for missiles. From the mid-1950s it was also the site for launching satellites, for example, the Explorer 1 satellite was successfully launched from there on 31 January 1958. Consequently, Cape Canaveral early became known globally for

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255 Original quotation: ‘den fortsatta utvecklingen skulle ske i samråd med militära myndigheter’, RA-SVKOM19, see n. 240.


its space activities. Hence, the reference in the Swedish newspaper article.\footnote{258}

This jovial phrasing of a ‘Swedish Cape Canaveral’ in combination with the phrase ‘European space base’ contributed to giving the readers of the newspaper an idea of Kiruna as a particular place for space activities, and that it was special not only in Sweden but also internationally.\footnote{259} These comparisons challenged the traditional notion of Kiruna as a Saami land, as an iron ore community, and as a place for hunting and tourism. Kiruna could also be seen as a place for advanced technology and space exploration. The Cape Canaveral nickname stirred the imagination in those who knew about the successful and promising space activities at the original Cape Canaveral. Perhaps they mused that Kiruna could also be the beginning of a similar venture—Kiruna could also be a place for space. This manner of naming is a form of place-making.\footnote{260} Another example is from a 1962 journal that referred to Kiruna’s rocket base as "The Cape Canaveral of Europe."\footnote{261}

Moreover, it is relevant to consider how this idea of Kiruna as a place for space could also include the \textit{kgo}. Many of those who had read about this Cape Canaveral analogy probably also remembered the inauguration of the \textit{kgo} in 1957, only four years earlier. To them, the idea of Kiruna as a special place must have seemed even more justified.\footnote{262}

\footnote{261}Original quotation: ‘Europas Cape Canaveral’, Praesto, see n. 236: p. 54.
Part of COPERS were two working groups. One was focusing on legal, administrative and financial matters, while the other, the Interim Scientific and Technical Working Group, with Lamek Hulthén as chair, worked on the scientific programme. At its third session on 24–25 October 1961 in Munich, COPERS approved the report prepared by the Interim Scientific and Technical Working Group.²⁶³

Among the projects suggested in this report was a category for rocket experiments. In connection with this, the establishment of a launching range for sounding rockets was brought up. Because of the precise scientific requirements, the site would have to be in the northern latitudes in the auroral zone, between sixty-five and seventy-two degrees north. In addition, it was also possible to use one of the existing national ranges for medium-latitude launches.²⁶⁴

The report listed three suitable locations for a northern site. The first alternative was Narssarssuaq in Greenland, which had a few important disadvantages, such as the difficulty to recover the payload due to the ice cap. In addition, it would be more expensive to establish the operation there, for example, with regard to accommodation and travel. The second option was the island of Andøya in the north of Norway. A major disadvantage here was the recovery of the payload because of the firings taking place over the rough sea. Also, accommodation would be rather difficult and expensive. The third and final alternative was Kiruna, which was recommended as the most suitable site of all three:²⁶⁵

The dimensions of this site are believed to be just adequate for firing sounding rockets up to 300 Km high; payload recovery would be relatively easy, firings taking place over land and the recovery area being reasonably smooth and unobstructed for the latitude. Down-range observation is possible. Accessibility to Kiruna is very good by air, road and rail, with the harbour of Narvik

²⁶⁴European preparatory commission for space research, see n. 263: p. 68.
²⁶⁵Ibid.: p. 64.
only 140 Km away. The proximity of the Kiruna town (27,000 inhabitants) is most convenient for personnel accommodation and range support: it should also ease recruitment. Furthermore it is believed that the presence of the KGO would be a great advantage.\textsuperscript{266}

Besides the fact that the topography and geography as well as the infrastructure were important, it is also noteworthy that the proximity to the KGO was taken into account. This is particularly relevant in the theoretical framework of how knowledge centres tend to ‘clump’ together. By motivating new activities and physical structures to an area where there already is some activity in place, COPERS contributed to making the place.\textsuperscript{267}

When the working group further specified what they thought this could lead to, they referred to close cooperation between the KGO and ESRO with regard to finances and administration, but they also mentioned the benefits of having the KGO situated geographically close to the launch site headquarters.

In connection with this, it is relevant to note that all member states were represented in each of the working groups, including the Interim Scientific and Technical Working Group. The subgroup responsible for the scientific program, which included the planning of the rocket base, was led by Bengt Hultqvist, the director of the KGO. Inevitably, with Hultqvist in this leading position, it was no wonder that the scientific program was in favour of the Swedish rocket base. In particular, Hultqvist’s interest in ionospheric studies in the auroral zone was reflected in the proposal. Some other member countries expressed concern that the sounding rocket program was not a true European cooperative project.\textsuperscript{268}

Regarding the competition with the Norwegian launch site, research has suggested that the Swedish alternative won partly because Sweden did not hesitate to join ESRO and partly because the Norwegian alternative had strong connections with the NATO military base close to the launch site.\textsuperscript{269}

\textsuperscript{266}Ibid.: p. 64.
\textsuperscript{267}For more on place-making of this kind, see e.g. Mats Benner & Sven Widmalm. \textit{Kunskap}, 1. uppl. Malmö: Liber, 2011: pp. 80–85.
Although much seemed in favour of Kiruna, there was also at least one challenge:

The use of a range in the Kiruna area, however, would be subjected to some limitations resulting from the fact that one or two dozen Lapps may be in the area during certain periods. Our present information is that these periods may be the months of April, May, October and November; further investigation may well prove that these periods may be shorter. This safety problem, however, is not believed to be serious. Nevertheless, the project would still require the approval of the Swedish Government.270

This matter of taking into account the Saami and their reindeer herding industry was going to require a governmental investigation. However, because of the deeply rooted ethnopolitical history of the Saami, with the conflicts between the Saami and the government, this was not guaranteed to be easily resolved.

**CONFLICT IN SAAMI LAND**

Thus, the plans of establishing the base on Saami land became a matter for the Government to resolve. Rune Fremlin (b. 1928) of the Ministry of Education and Ecclesiastical Affairs met with the Swedish Committee on Space Research on 28 October 1961 to discuss a range of issues related to the planned launch site, such as residential Saami activities, natural protection, tourism, and land owner interests.271 Following this meeting, the Government issued on 10 November a decree to the Judge of the Water Court in Lower Norrbygden (Nedre Norrbygdens Vattendomstol), Lennart Persson (b. 1922).272 He was to investigate the consequences of the planned rocket field for the Saami people, and to work out a proposal for the security measures and regulations that

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270 European preparatory commission for space research, see n. 263: p. 65.
272 The Water Court in Nedre Norrbygden was a court for the trial of water law cases in the north of Sweden. It had experiences processing cases similar to this one. See also Össbo, see n. 249.
would be implemented if such a rocket field were to be used.273

Persson arranged a meeting in Kiruna on 5 December with representatives from the Swedish Committee on Space Research, the KGO, the Norrbotten County Administration (Länsstyrelsen i Norrbottens län), the Lapp Administration (Lappväsendet), and the Legal, Financial and Administrative Services Agency (Kammarkollegiet) to discuss the matters further. This caused some headlines in the regional press. For instance, one newspaper, which reported ‘the Saami have big demands on the space research,’ wrote about the negotiations between the Saami and the scientists regarding telephone lines, security shelters, a new road, and reindeer fences.274 Another newspaper focused on the risks of the rocket field and the concerns among the Saami that the field would become a military rocket base.275

Around the same time as the meeting took place, the Swedish Society for Nature Conservation wrote a complaint about the planned rocket field being valuable from botanical, zoological, geological, and natural geographical perspectives. If the launch site would still be constructed, it was urgent to protect the areas around Tästojäure and Kummajoki where tourists and recreational fishers frequented as well as the area in Tavaätnos and its marshlands.276

Persson presented his investigation on 29 December 1961. He concluded that four Saami villages were affected by the planned rocket field: Könkämmä, Lainiovuoma, Saarivuoma, and Talma (Figure 3.2). Altogether, 646 people and over 30,000 reindeer in these four villages were going to be affected by the rocket base. While most Saami people had started to live in permanent housing located outside the planned rocket field, there were still some cabins and camping sites that were used more or less throughout the seasons, although


mostly during the autumn period from mid-September to mid-December, but in some cases also in the summer and in one case all year. From mid-December until mid-March, the area was almost entirely deserted by reindeer herders and reindeers.\textsuperscript{277}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{map.png}
\caption{The boundaries of the Saami villages. The four Saami villages that were affected by the planned rocket field are labelled. It should be emphasized that a Saami village is a large geographical area. Map made in qgis by the author. ©Lantmäteriet [Licence 12014/00569]}
\end{figure}

The rocket field would be arranged into three areas.\textsuperscript{278} The launch site area would be sealed off by a fence. The immediate area outside the launch site would be called Risk Zone 1 would not be fenced, and it was recommended

\textsuperscript{277}There were four large Saami camps in the area: Vuoskojaure, Raggisvare, Järrämjäkk (sometimes called Järämä), and Pulsujärvi.

\textsuperscript{278}In the early documents they are referred to as Zone 1, 2 and 3, but at a later stage they were renamed Zone A, B and C respectively.
that no one be present inside the area during rocket experiments. Even though the investigation showed that Saami people only rarely visited this area, there were others such as forest workers, who at times had to work there. A reasonable solution was to install one or more security shelters inside Risk Zone 1 so anyone who was nearby could seek shelter if there was no available option to escape the risk zone altogether (Figure 3.3).

Moreover, the investigation recommended that a reliable warning system was arranged. First of all, the rocket experiments would have to be announced in the local press. The boundaries for Risk Zone 1 had to be clearly marked in the terrain. Warning signals had to be made prior to each rocket launch. The impact area could also be searched from a helicopter during daytime.

Figure 3.3: The position of the security shelters (red triangles) in the Esrange impact area (orange) relative to the Saami villages. Map made in QGIS by the author. ©Lantmäteriet [Licence I2014/00569]
The Saami who herded reindeer in the area had informed the investigator that they preferred letting the reindeer stay inside the field during rocket experiments, and afterwards the reindeer would be checked, using a helicopter, to make sure there were no injured animals.

The largest area was referred to as Risk Zone 2. Due to its size, it would not be possible to evacuate the area prior to launches, and security shelters would be provided for people who happened to be in the area during a launch (Figure 3.4 and Figure 3.5).

![Figure 3.4: The exterior of a security shelter in the Esrange field. Source: Esrange shelter at Vassejävri, outside. Web page. User: Gerrit. URL: https://commons.wikimedia.org/ (visited on 2015-04-05) (License: Creative Commons Share-Alike 3.0)](https://commons.wikimedia.org/)

In addition, radio or telephone connections would be provided for some Saami camps. Radio transmitters would also be set up in the area so that reindeer herders equipped with mobile radio receivers could be contacted wherever they were located. The Saami would be informed via telephone and
radio prior to each rocket experiment. Finally, in Risk Zone 2, there would be warning signs on paths and trails leading into the area.

![Figure 3.5: The interior of a security shelter in the Esrange field. Note the radio equipment. Source: Esrange shelter at Vassejävri, interior. Web page. User: Gerrit. URL: https://commons.wikimedia.org/ (visited on 2015-04-05) (License: Creative Commons Share-Alike 3.0)](image)

Besides these security precautions, there would also be economic compensations to the Saami for any damages and intrusions caused by the rocket experiments. The investigation reached the conclusion that the equivalent of 2,000,000 Swedish kronor would be reserved for this purpose. Because the Saami had requested a road in the area, one option would be to use part of this sum to set up a new fifty kilometre westbound road connecting the Vittangi-Karesuando road to the area by Pulsujärvi Lake in the middle of the impact area. Such a road would be very useful to the Saami not only in their reindeer herding but also for other purposes such as transport of firewood and berries. Above all, the Saarivuoma and Lainiovuoma villages would be-
nefit from this road, but to some extent also the Künkämä and Talma villages. Because of this imbalance in the distribution of benefits, the investigation suggested a sum of 250,000 Swedish kronor reserved for Künkämä and Talma alone. This sum could be invested in reindeer fences along the Künkämä River and between the Talma and Saarivuoma villages.²⁷⁹

SAAMI RESPONSE

At the National Association of Swedish Saami conference in Arvidsjaur on 14–17 March 1962, the Association discussed, among other topics, the recent investigation that had been carried out by Lennart Persson.²⁸⁰ One speaker, Olof Tuuri (1907–1986), represented the Talma Saami village.²⁸¹ He expressed concern that Talma in particular would suffer from the planned rocket field. According to him, the Talma Saami people had initially reacted strongly when they were first informed of the plans, although they had become calmer after the information meeting. Even so, Tuuri was concerned:

The launch site and Risk Zone 1 is in the middle of Talma’s winter grazing pastures. I have been part of the reindeer grazing land investigation and visited the entire reindeer herding area. Everywhere people have said that the winter grazing is most important for the reindeer husbandry. When a large part of this winter land will be destroyed, alternative solutions have to be found. I cannot accept the proposed compensations. Some arrangements have to be made.²⁸²

²⁸¹ Tuuri’s registered surname was spelled Thuuri but he appears in the documents as Tuuri. In 1960, he had been involved in a governmental investigation of hydroelectric power plants. See Össbo, see n. 249: p. 201.
Tuuri’s statement shows how the suggested division of the rocket field into the different zones was not so easy to accept by his Saami village. Moreover, it highlights how different layers of maps are projected onto each other, where the boundaries do not always align with each other. In the case of the Saami villages, the boundaries were largely aligned according to the topography of the landscape, with boundaries oriented in a north-west to south-east direction. In addition to this was the seasonal-dependency of their industry. These two factors were difficult to combine with the proposed Risk Zones.

The Association agreed to make a statement regarding the recently published investigation. They demanded that the proposed road would be built, that compensation would be made for the extension of Risk Zone 2, and that the Saami would get an opportunity have a jurist present when expressing their opinions about the road and other questions.\textsuperscript{283}

The Saami would continue trying to win their case regarding the land they considered they had lost in favour of the rocket base. In 1966, Per Idivuoma (1914–1985), representing the Lainiovuoma Saami village, was interviewed by the Samefolket periodical concerning the ESRO base and other matters.\textsuperscript{284} According to the article, Idivuoma said that Talma had not received sufficient compensation, probably because Talma’s ‘own’ representative had not stepped forward and explained the situation and no one else had spoken on behalf of Talma. It is not clear if Idivuoma was referring to Tuuri. However, judging from the interview and the previous events, it seems that a mistake in the lack of communication—whether deliberate or because of ignorance or other reasons—led to Talma being unfairly compensated.\textsuperscript{285}

Another complaint was written by the Saami reindeer herder Per Jonas Blind (fl. 1969) who had a number of general complaints about the results of the investigation. Above all, he criticized the shelters and the communication solutions. In his conclusion, he pointed out that the Saami had been dealt with

\textsuperscript{283}Ibid.: 47f.

\textsuperscript{284}His full registered name was Nils Petter Per Stefanusson Idivuoma but the documents refer to him as Per Idivuoma. ‘Från Renskogen’, in: Samefolket : organ för Svenska samernas riksförbund och Sällskapet Same-Ätnam, 2 (1966).

\textsuperscript{285}For a more recent retrospective account from two Talma representatives, see Lars Daniel Svonni & Marit Anne Allas. Talma sameby : bosättningar, renbetesmarker, flyttvägar i ett historiskt perspektiv, Ålvsbyn: Ålvsbytryck, 1999: 54ff.
arbitrarily. The security precautions were only symbolic and even insufficient, as far as he was concerned, because at a number of times projectiles had crashed far outside the risk zones. Consequently, he called for a re-evaluation of the security risks involved.\textsuperscript{286} As should be evident from these examples, the issues surrounding the security precautions would remain even after the Esranger base would be completed.

What is described above with the rocket launch site being situated in the landscape, and the shelters constructed at various locations inside the different zones, is a striking example of what the historian of ideas Sverker Sörlin has referred to as the articulation of territory.\textsuperscript{287} On the one hand, there were the Saami who claimed rights to the lands. This was not the first time they had to encounter governmental superiority over their lands. For example, in 1887 the Swedish Government had decided on a law that divided the Swedish Saami territory into administrative units called ‘lappbyar’ (Saami villages).\textsuperscript{288} On the other hand, there was ESRO, represented by its prospective Swedish member state, that also claimed rights to the lands. The authorities divided the landscape according to their needs, with the zones of the rocket field being arranged with respect to the location of the rocket launch site and the calculated impact area. In both cases, the boundaries become symbols of territory. Because of the risks of being inside the area where rocket debris might fall down, the zones were meant to keep people outside rather than inside. It was a matter of excluding local people from an area they have traditionally had rights to. Interestingly, Sörlin makes a connection to symbols of territory in the colonial world, where the national was being extended into the local by the use of flags, fortifications, customs stations, roadblocks, etc. Similarly, the Swedish state had marked its territory in the Saami lands, perhaps in a more subtle way under the flag of science

\textsuperscript{286}Per Jonas Blind. ‘ESRO och samerna’, in: Samefolket: organ för Svenska samernas riksförbund och Sällskapet Same-Åtnam, 1 (1969); A third, more recent example of how the problems have persisted was reported by the media in 2008, when a rocket had crashed close to where a couple of Saarivuoma reindeer herders were working. ‘Esrangeraket slog ned nära samer’, in: Dagens Nyheter, (2008-04-19) (henceforth cited as DN-2008-04-19).

\textsuperscript{287}Sörlin, ‘The articulation of territory: Landscape and the constitution of regional and national identity’, see n. 27.

\textsuperscript{288}Lantto, Tiden börjar på nytt: en analys av samernas etnopolitiska mobilisering i Sverige 1900–1950, see n. 246: p. 39.
and technology, but the effect was largely the same. This part of the landscape had become expropriated for purposes of science and technology. The sign in Figure 3.6 is a message to the Saami, hunters, fishers, tourists, and others who approach the area. The act of mapping out and naming the zones is political and includes the power to define and identify; as such, it is a form of place-making.

![Figure 3.6: A sign by Esrange's impact area warns visitors that ‘trespassing is dangerous during rocket launching’. The sign is in five languages: Swedish, English, German, French, and Saami. The box contains further instructions regarding the security precautions. Photograph by David Erixon Source: David Erixon. Email to the author. 2015-03-13 (Courtesy of David Erixon)](image)


290 Tuan, see n. 260: p. 688.
Organisation of Swedish space research

In March 1962, the Swedish government issued the 1962:85 Government Bill on ‘the Swedish participation in a convention for the setting up of a European space research organisation’. The administrator Jan Stiernstedt would later refer to this bill as the founding document of Swedish space activities, because this was when the Government acknowledged space as a resource to be utilised in a national Swedish space program and as part of the European collaboration. In addition, the document also acknowledged the natural resource of the geographical location of Kiruna in connection with space activities. Stiernstedt’s summary of the bill is in accordance with the notion of the place-making process being not only about the horizontal geographical dimension but also about the vertical dimension.

The founding document

The instruction of the 1962:85 Government Bill was, simply put, to investigate how the management of Swedish space research ought to be organised, as well as to investigate the suitable forms for coordinating Swedish space research with the European and other international space research organisations. The bill was based on previous work by representatives of the Swedish Committee on Space Research.

Regarding the budget, the European scientific program would encompass civilian cooperation in space research and technology for an initial period of eight years, and the total cost for all member countries was estimated at 1,575 million Swedish kronor. Sweden was going to contribute with about five per cent or 77.5 million Swedish kronor in total. For the first three fiscal years, the sum would be 19.6 million Swedish kronor. Of the total 1,575 million Swedish kronor for the first eight years, about 53 million Swedish kronor were

294 Five (or, more precisely, 4.92) per cent was based on the first three years where Sweden would contribute with 19.5 million Swedish kronor (for each year: 4.3 million; 6.5 million; 8.8 million).
earmarked for the Kiruna rocket base project. The total number of people
to become employed was estimated to be about 1,300 including some 600
researchers and engineers.295

The bill declared what scientific experiments were planned. Regarding the
planned Kiruna base, the bill referred to the Interim Scientific and Technical
Working Group of the Preparatory Committee who had found that Kiruna
was the best alternative. However, this base would only be used for high-
altitude rockets. For satellites and space probes, ESRO would have to use
existing bases in other parts of the world.296

A number of national bodies reviewed the bill. Some commented spes-
cifically on the matters concerning the security of and the recompense to
the Saami, and some commented on the proposed plans of a Kiruna base
as such. The general attitude among the bodies was positive. All supported
the proposed security regulations and the compensation to the Saami. Re-
garding the selection of Kiruna as the location for a launch site, all bodies
were positive except for the Swedish Society for Nature Conservation and the
Swedish Alpine Club (Svenska Fjällklubben) who both pointed out that the
area was ‘a natural hunting and recreational area for those people who live in
its vicinity’.297

More specifically, the Swedish Society for Nature Conservation said that
the area was still relatively unexplored by tourists, but this was expected to rise
in the future. For example, during the last years there had been 150 overnight
stays annually in the Pältsa cabin close to the Three-Country Cairn (Treriks-
röset) north of the impact area. The area was good for fishing, and there were
efforts to intensify the flow of foreign sports fishers. Thus, considering the
botanical, zoological, geological, and natural geographical aspects, as well as
the recreational matters, the Swedish Society for Nature Conservation could
not support the idea of rocket launches in the area.298 In connection with this,
it is relevant to point out that rocket bases, such as the National Aeronautics
and Space Administration (NASA) Kennedy Space Center in the United States

295 Ibid.: pp. 130.
297 Original quotation: ‘ett naturligt jakt- och rekreationsområde för de personer, som är
and the Guiana Space Center in French Guiana, which have large enclosures similar to that of Esrange, in retrospect have turned out to be—at least to some extent—preserving nature.299 These areas tend to be prohibited areas for the public, and construction of roads or buildings is forbidden except in rare circumstances.

The Swedish Tourist Association, however, did not reject the proposed rocket field. If a satisfying solution could be found regarding the use of the area for recreation and outdoor activities, so that the tourists could move about without ‘too inconvenient restrictions’, there would be no problems to go through with the launch site plans.300

The bill was approved unanimously by two standing committees of the Parliament, the Committee on Foreign Affairs (Utrikesutskottet) and the Committee on Supply (Statsutskottet).301 It was debated in the second chamber of the Parliament.302 For example, Gustav Johansson (1895–1971) of the Swedish Communist Party expressed concerns that cooperation could infringe on Swedish neutrality. The countries involved in the European collaboration, he claimed, were all part of NATO, while other European countries such as Poland, Czechoslovakia, and Yugoslavia had been left out. In response to this, a Parliament member argued that the documents stated clearly that it was a civil cooperation, which had also been a prerequisite for other neutral countries such as Switzerland and Austria to participate.303

The ESRO convention was signed by Sweden on 15 June 1962, although it would take until 20 March 1964 before the convention was entered into force. There were ten member countries: Belgium, Denmark, France, the Federal Republic of Germany, Italy, the Netherlands, Spain, Sweden, Switzerland, and the United Kingdom.304

299Redfield, see n. 66: 173–289
301Utrikesutskottets utlåtande nr 2 år 1962; Statsutskottets utlåtande nr 75 år 1962.
303Riksdagens protokoll år 1962, Andra kammaren, nr 18, §9; Utrikesutskottets utlåtande nr 2 år 1962, see n. 301.
304Riksdagens protokoll år 1962, Andra kammaren, nr 18, §9, see n. 303; Statsverksproposi-
The Governmental space committee

Based on recommendations in the 1962:85 bill, The Ministry of Education and Ecclesiastical Affairs appointed a new group of experts who would continue investigating the Swedish space programme.\textsuperscript{305} Gustav Fredrik Ernst Cederwall (1913–2008), a head of division at the Ministry of Finance, was delegated chair.\textsuperscript{306} The other members were Alfvén, Funke, Sterky, Hultqvist, Lindblad, Lamek Hulthén, and Bolin—all of whom have been mentioned—as well as a two new names such as the head of a department at the aeroplane company saab, Lars Harald Brising (1915–1995) and the telegraphy technologist Christian Jacobaeus (1911–1988). Brunberg was appointed secretary. In addition, Fremlin would participate as an external expert.\textsuperscript{307} Thus, the members represented the government, scientific institutes, and large companies, a form of collaboration typical of the time.\textsuperscript{308}

The group, which formed in May 1962, assumed the name the Space Committee (Rymdkommittén). It would operate as an interim council on space research matters and would liaise with the international Committee on Space Research.\textsuperscript{309} As with the preceding Committee on Space Research,
this new body was largely occupied with taking over the organisation of the rocket experiments, not least the ones at Kronogård in 1962–1964. They also continued the matter of the planned site in Kiruna.310

Bolin represented the Space Committee and Sweden at the COPERS meeting in Paris in March 1962. The delegates discussed the rocket experiments that were on the agenda for the next few years. Because of the delays in ratifying the ESRO convention, some planned rocket experiments had to be postponed. A contributing factor was the slow processing of the security issues regarding the Kiruna base. Another problem had to do with the limited capacity of the planned Kiruna base. In order to launch satellite instruments, rockets had to be launched to heights higher than 150 kilometres altitude, which was more than was intended for Kiruna. Consequently, the COPERS delegates considered other options, at least for the period 1964–1965. The alternative launch sites included Sardinia, the Sahara, Andøya, a temporary site on Greenland and Fort Churchill in Canada, and a temporary site in Kiruna. Bolin recommended to the Space Committee that they push for a faster resolution of the security matters that were stalling the Kiruna rocket base.311

The Space Committee published its official governmental report in September 1963. They proposed a number of initiatives that would benefit the Swedish space programme. First, there would be a national council for space research with the aim of supporting research, technological development, and related space activities. Second, a space institute would be formed to function as a service provider for Swedish space research. Third, this space institute would initially be placed at a temporary site until a new building could be constructed. An appropriate location would be in the vicinity of a university,
university college, scientific institute, or similar. The fourth and last recommendation was to prepare a temporary Swedish launch site in Kiruna for sounding rockets in the vicinity of the planned permanent base. The Space Committee suggested that this launch site be ready for use in the summer of 1965 because of the likely difficulties in using the Kronogård launch site after 1964. In addition to these suggestions, they stressed that an increased Swedish space budget was motivated.\footnote{SOU 1963:61. 
\textit{Organisatoriska åtgärder för rymdverksamhetens främjande}: 78f.}

\textit{‘Wilderness Years’}

The Space Committee’s proposal was considered in the 1964:69 Government Bill. The proposal had been under consultation by a number of institutions and organisations, and their opinions varied considerably. For example, the idea of a research council for space activities was disliked by most bodies, with the motivation that the funding for space research should be done through existing research councils. The proposed space institute was met with mixed opinions, ranging from rejection to approval, and some middle stances that, for instance, suggested the matter needed further investigation.\footnote{Ibid.: pp. 44–50.}

Concerning the location of such an institute, both Kiruna Town and the Norrbotten County Administration recommended that the question should be further investigated, in particular with Kiruna as an option. Kiruna was interesting because of the potential connections with the rocket base there.\footnote{Manfred Näsland till Konungen (Kungl. Eckl.dep.), IÄ-35-63, 1963-12-09. B I:2 Redogörelser och utredningar 1963. Rymdkommittén (SE/RA/420539). Riksarkivet, Stockholm (henceforth cited as RA-RK8); Björn Olsson & Ulf Wiberg. 
\textit{Universitetet och den regionala utmaningen}, Stockholm: Swedish Institute for Studies in Education and Research (Institutet för studier av utbildning och forskning) (SISTER), 2003: 82f.} The Norrbotten County Administration also pointed out that a space institute in Kiruna would have valuable connections with a potential technical university college in the north of Sweden. At the time, there were plans to establish a technical university college in Luleå, and the Board was optimistic about the potential collaboration between such a college and the space activities in Kiruna.\footnote{Kungl. Maj:ts Proposition 1964:69: pp. 44–50.} Another referral, the Royal Swedish Academy of Engineering
Sciences (Kungliga Ingenjörsvetenskapsakademien), considered that it would probably be better to have the institute in a more central location (i.e. in Stockholm), but also pointed out:

The Academy finds it relevant that the Institute is provided a good connection to the higher education and existing research institutes. It would be desirable that the activity that will be located in northern Norrbotten will have a connection to the education in natural sciences that is now starting at Umeå University [UMU], to secure recruitment of young scientists.\(^\text{316}\)

What the Royal Swedish Academy of Engineering Sciences pointed out is particularly interesting in a spatial theoretical framework, because here it becomes visible that it was not only a matter of the institute being close to the KGO or the rocket launch site, but also to institutes of higher education. At the time, in late 1963, there was no university in northern Sweden; Uppsala University was the northernmost Swedish university. However, the government had decided to establish a new university in Umeå, and there was already some higher education taking place there even though the university was not inaugurated until 1965.\(^\text{317}\)

The quoted passage above suggests a kind of acknowledgement that not only was the Kiruna area important by being able to attract new space-related activities and installations, but it was also important to attract students from the larger region. As such, the space activities had something to give in return. In other words, there was a mutual exchange of resources, opportunities, and knowledge between Kiruna and the larger surrounding region.

Regarding the setting up of a specific national Swedish launch site for rockets, a group of referrals recommended that the matter be put on hold until it was investigated whether the ESRO base could be used for this purpose.


\(^{317}\) Higher education and UMU will be discussed again in chapter 5. See also Olsson & Wiberg, see n. 315: 98f.
A second group was in favour and a third group against the idea of a Swedish launch site. For example, the Royal Swedish Academy of Sciences argued for a separate Swedish rocket base:

[...] our [Sweden's] own rocket launches, where these are considered scientifically motivated, above all should be arranged from a Swedish base near Kiruna, in the vicinity of, but outside the ESRO base. This means the same trajectory area north of the base can be used, and that the contact with the KGO and other collaborating facilities in this part becomes easier.\(^\text{319}\)

However, the Swedish Technical Research Council was of a different opinion:

Without doubt, it is required to have an option for launching rockets. TFR [the Swedish Technical Research Council] has not found any fundamental motivations to have a completely separate Swedish launch site in the vicinity of the ESRO base in Kiruna. A close collaboration ought to be established.\(^\text{320}\)

Ragnar Edenman, the Minister of Education, also commented on the Committee's proposal. His conclusion was that the existing research councils should continue to be responsible for the funding of Swedish space research. In accordance with what several of the consulted institutes had recommended, he could not approve of a special space research council to be formed. Nor could he approve of a Swedish space institute or the idea of a Swedish rocket launch site in Kiruna.\(^\text{321}\)


Consequently, based on the referrals, the government turned down the Space Committee's proposal, and the Space Committee was discontinued on 1 July 1964. A new body was required to take over the national organisation of Swedish space research. To this end, the Space Board of the Swedish Research Councils (Forskningsrådets rymdnämnd) was formed in September 1964 by the Swedish Natural Research Council, the Swedish Technical Research Council, and the Swedish Medical Research Council. The purpose of this Board was to encourage Swedish space research, or more specifically, natural scientific, medical, and technical experiments that could be performed using high-altitude rockets, satellites, or spacecraft. Among the members were, once again, several familiar names such as Hultén, Lindblad, Funke, Alfvén, Bolin, Hultqvist, and Brunberg. While the full list of members is not important to the context of this study, it is relevant to highlight those names that reoccur throughout most of this development. These actors discussed among themselves the arguments and motivations for the space activities and lobbied for the launch site to be situated in Kiruna.

While this Space Board focused on national Swedish space activities, the matter of the Swedish participation in the European space collaboration also required an organisation. For that purpose, a national ESRO Committee was set up in June 1964.

In retrospect, Hultqvist described this as a ‘harsh blow for the Space Committee and for Swedish space researchers’, and this was followed by several years of very limited grants. The period from 1965 to 1972 has been

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324 RA-RN1, see n. 322.


326 Hultqvist, Space, science and me, see n. 57: p. 20.
referred to as ‘the wilderness years’ by several of those who were involved at the time.\textsuperscript{327}

The agreement between Sweden and ESRO for the use of Esrange came into force on 29 July 1964. Despite the limited funding, this marked the starting point of the construction of the base and its main facilities (Figure 3.7 and Figure 3.8).\textsuperscript{328}

\textbf{Figure 3.7:} The main building at Esrange circa 1966. Source: Börje Rönnbergs fotograf av huvudbyggnaden, odat. F 1:12 Handlingar rörande rymdtekniska gruppen ESRANGE 1963–1971. Forskningsrådets rymdnämnd (SE/RA/420540). Riksarkivet, Stockholm (henceforth cited as RA-RN3)

\textsuperscript{327}The phrase ‘wilderness years’ generally refers to a period of disfavour, often in a political context. ibid.: p. 20; Stiernstedt, \textit{Sweden in space: Swedish space activities 1959–1972}, see n. 57: pp. 165–176; Grahn, \textit{Jordnära rymd : min rymdhistoria}, see n. 57: p. 60.

\textsuperscript{328}Statsverksspropositionen år 1965: Bil.10: Ecklesiastikdepartementet, E 109, see n. 304.
Figure 3.8: Drawing showing the Esrange base area. Note the direction of the north arrow. The road from Kiruna is in the west, at the bottom of the illustration. The main facilities is marked as 'Huvudbyggnad', and the launch site is marked as 'Skjutramp', further east. Notice also the location of the radar station on the radar mountain to the south. Of interest is also the fence that runs around the whole base area, marked as a line with jagged intervals. The river just north of the site is Vittangi River. Illustration by Lars Rey. Source: Lars Rey & Lennart Lübeck. 'Esrange – europeiskt raketskjutfält i Kiruna'; in: Teknisk tidskrift, (1966): p. 1050 (Courtesy of Lars Rey)
The inauguration of Esrange

Esrange was inaugurated on 24 September 1966. The ceremony gathered representatives of several national, regional, and local authorities, organisations, and institutions, as well as many international representatives of space research and industry. In addition, a few Saami people were also present, dressed in traditional costumes and displaying reindeer in an enclosure. Because of the international guests and the mass media interest, the officials apparently considered it important to have the Saami culture represented. When the ceremony continued in Kiruna town centre, there was an artistic installation called *Minos Palace*, by the artist Olle Bonnier (b. 1925), inspired by ancient Greek mythology and the relationship between technology and art, and later also a banquet at the town hall hosted by the Swedish state and Kiruna Town.\(^{329}\)

Edenman gave a speech where he talked optimistically about the ambitions of the new European cooperation:

> Scientific research of today is to a large degree about teamwork. Perhaps particularly research in space. For that, there is a need for a very intimate collaboration across borders. Sweden’s participation in ESRO should be seen as an expression of our willingness to take our share of this partnership. We do not hesitate to make available both our territory and our own researchers to the benefit of the joint effort.\(^{330}\)

Although Edenman did not mention Kiruna or the region, he talked about how the Swedish territory would become more closely tied to the European


\(^{330}\)Original quotation: ‘Vetenskaplig forskning idag är i hög grad ett lagarbete[…]. Det gäller kanske speciellt forskningen i rymden. För den behövs ett mycket intimt samarbete över gränserna. Sveriges deltagande i ESRO skall ses som ett uttryck för vår vilja att ta vår andel i det samarbete [sic]. Vi tvekar inte när det gäller att ställa både territorium och våra egna forskare i det samarbetets tjänst’ (Added emphasis) It seems Edenman held his speech in English. However, the English version given here is my own translation based on the Swedish quotation in the newspaper, which is likely to be more or less how Edenman phrased it. ‘Champagnebrisad mot ramp invigde Esrange’, in: *Norrländska Socialdemokraten*, (1966-09-26) (henceforth cited as NSD-1966-09-26); See also Lennart Skogsberg. ’Nu kan rymdforskningsn börja,’ in: *Norrbottens-Kuriren*, (1966-09-24) (henceforth cited as NK-1966-09-24a).
space community. This should be considered in the context of Sweden and particularly the north of Sweden as having been seen as a relatively isolated place at the periphery. This can be compared, for example, with the earlier references to the KGO, where Willy Stoffregen had talked about Kiruna being an isolated place and Yngve Öhman similarly had said how it was a boring region. With the KGO and now Esrange, the north of Sweden had become even more accessible, perhaps less mysterious and isolated than before.

The media coverage was rather extensive by Swedish proportions. The front-page caption on the regional newspaper *Norrbottens-Kuriren* contained the words ‘the space town of Europe’ and emphasized that this was not just a local, regional, or even national matter but something of a European scope.331 With Esrange, Kiruna and Sweden had become part of a larger community, and this tied in well with the quotation above from Edenman’s speech.332

In connection with this are the many newspaper adverts that often occurred on the same pages as the articles that reported about the inauguration. These adverts represented the different companies involved in the construction of the rocket base, ranging from digging the ground and construction, moulding, installation of pipes and electricity, roofing, painting, transportations of construction materials and machines, and more. Some adverts included illustrations of rockets or used rhetorics that referred to rocket launches. For example, an advert for the northern Swedish newspaper *Norrländska Socialdemokraten* (NSD) displayed a rocket, labelled ‘NSD’, taking off next to the text ‘NSD’s circulation is shooting high—Now 40,909 copies.’333

Another example was an advert by the Kiruna Town Treasury (see Figure 3.9). Thus, the town, the different companies, and the newspaper became actively involved in the process of associating Kiruna and the region, not least Norrbotten County, with space activities. Of particular relevance is how they interpreted the vertical dimension implied by the rockets.

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332 For an ethnographic perspective on nationalism in the context of the European space cooperation, see Zabusky, see n. 39: 30f.

Once again, newspapers highlighted Esrange as a Swedish version of Cape Kennedy, the new name of the Florida launch site. More noteworthy is that this time the comparison was made by one of the most eminent national newspapers Svenska Dagbladet that wrote: ‘Esrange, the European space research organisation’s own Cape Kennedy outside Kiruna, is inaugurated soon.’ As pointed out earlier, this comparison with Cape Kennedy was an important step in the social construction of Kiruna as a space town. The fact that it was not only a regional newspaper but now also a national newspaper

that had caught on to the comparison illustrates that this emerging idea of Kiruna and its rocket base as a special place was becoming a national matter.

Norrbottens-Kuriren, however, did something new this time by drawing parallels between the new space activities and the other functions that Kiruna was known for: ‘The mining town and wilderness town of Kiruna is now also the space town of Europe—an encounter between shining technology and sullen wilderness—is today officially opened.’ This quotation highlights one of Kiruna’s characteristics as a place that has been remade several times. As the introduction of this dissertation pointed out, Kiruna could be interpreted as, for example, a mining town or a military town. The quotation above suggests additional ways of seeing Kiruna as the wilderness town and the space town. This naming process is a way of ascribing or attributing the town with certain qualities. By associating the place with symbols, properties, and characteristics, this naming process is a form of place-making.

Moreover, the power to name is not privileged to officials, but it is something that a newspaper can also do. Although newspaper articles alone might not be sufficient to redefine the identity of Kiruna, it is plausible to say that they contribute to such changes by instilling in the public the idea of this identity. The articulation of Kiruna as a place for space was in contrast to the already familiar ‘identities’ of Kiruna as a mining town and a military town, or other ways of interpreting Kiruna. Moreover, by associating this space town identity with the Esrange rocket base and the surrounding nature, it was an obvious example of how the physical, geographical territory, including the vertical near space, was made relevant. The notion of a space town did not refer to merely an activity but also a specific site, including nature (e.g. wilderness and winter), the artificial structures (e.g. the base area with its buildings as well as the large, fenced rocket field), and the near space above (with the northern lights and other phenomena). Research has suggested that the sense of national or regional identity can be connected not only with physical attributes of landscape but also with artificial structures such as buildings and towers or even larger interventions such as parks, dams,

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336 Tuan, see n. 260: p. 688; Gieryn, ‘A Space for Place in Sociology’, see n. 82: p. 468.
and water reservoirs. The newspapers contributed to the making of such a connection, and consequently also to the making of Kiruna as a particular place.

![Image](image.jpg)

**Figure 3.10:** The rocket launch site at Esrange in 2008, seen from the south. This is also the illustration on the cover of this dissertation. Source: *A REXUS rocket is launched from Esrange in Kiruna, Sweden.* Web page. European Space Agency. URL: http://www.esa.int (visited on 2015-04-03) ©Swedish Space Corporation (Courtesy of Swedish Space Corporation)

### Conclusions

The establishment of the Esrange rocket base and its wide impact area was the latest addition to Kiruna Town with regard to space-related settings. As with the setting up of the KGO, the perhaps strongest argument to place Esrange in Kiruna was its geographic location in the auroral zone. Another central argument concerned the presence of a large, almost uninhabited area, which was relatively safe for performing rocket experiments. In contrast to when

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337 Jaworski & Thurlow, see n. 27: p. 7.
the KGO was set up, which was the beginning of something essentially new in Kiruna, Esrange had a more stable foundation to build on in the form of both the town of Kiruna and the KGO. Thus, an interesting aspect to emphasize here is how Esrange largely was motivated to be set up in Kiruna based on what was already there in the form of space activities and structures. Scientists, politicians, and others who advocated for the rocket field to be placed in Kiruna used these different arguments—including features of nature and pre-existing physical structures—to distinguish Kiruna from other places. This is what Paasi refers to as the identity of a region.\textsuperscript{338}

Another aspect to comment on concerns the actors behind the initiative to set up Esrange. This was largely a centrally planned effort involving the Swedish government in close cooperation with several other governments in Europe. On a regional and local level, many actors encouraged and supported the plans. Obviously, for Kiruna Town this was an important contribution to the economy. Despite the many supporters, however, there were the Saami who felt their interests were neglected by the state and by others in favour of the project. In addition, with regard to individuals involved in the planning of Esrange, it is not possible to point out a single person who orchestrated the work. Several individuals reoccur in the different boards and groups that in one way or another contributed to placing Esrange in Kiruna. Worth noting is that industry was deeply involved. Moreover, there were loose connections with the Swedish military, in part through the Research Institute of the Swedish National Defence but also indirectly through some technology companies. However, officially, the Swedish participation in ESRO, including the activities at Esrange, was a civilian project.

Esrange had a great impact on the geography of the area. On an international level, Esrange connected Kiruna and Sweden with Europe in a new way. Added to the notion of the north of Sweden being a peripheral and isolated land was the idea that Kiruna also, in a sense, was a centre for space activities—not only in a Swedish context but also in a European context.

In addition, Esrange meant a lot on a more regional and local geographical level. The vast impact area that was set up north of the town of Kiruna encompassed a large part of the area making it a no-go zone during rocket

experiments. Because the impact zone cut across four indigenous Saami villages, this led to negotiations between the proponents of the rocket field and the representatives of the Saami villages. Thus, on a local level, the rocket base and the impact area had implications not only for politics but also for the Saami culture and industry. The outcome of the negotiations was that the Saami villages arguably agreed to have large parts of their traditional herding lands become an impact area. A different way of putting this—and to link to the title of this dissertation—is to say the Saami had to make place for space activities. Conversely, it is also noteworthy how those responsible for the rocket experiments, in accordance with the agreement, to some extent had to restrict the operational activities to allow the Saami to practice their reindeer herding. For example, part of the impact area was only going to be used for rocket campaigns in the period from 15 September to 30 November each year, which is the period when the reindeer stay in the lower mountain regions outside the area. The idea of the far north of Sweden as a land of wilderness was now somewhat distorted by the rocket technology; the contrast between the ‘wilderness’ and technology is rather striking.

Thus, the geographical area that constituted parts of the Saami villages later also formed the Esrange impact field. These were two very different ways of using, interpreting, and identifying with the same physical area. Other groups—such as hunters, environmental experts, tourist representatives, and the military—had additional perspectives of the place. This suggests there are many ways to understand and assign meaning to a geographical area, and consequently many ways in which a place is made.339

The geographic contrast between Esrange, the KGO, and Kiruna is also worth elaborating on. By necessity—because of the risks involved with the rocket technology—the impact area had to be established in the relatively ‘empty’ space in the northern part of the Kiruna area. A consequence of this was that the rocket base and the related facilities were placed about forty kilometres east of Kiruna town and about thirty-two kilometres east of the KGO. A relevant question to ask in connection with this is to what extent the KGO and Esrange could be said to be in the vicinity of each other and of the town of Kiruna. Although not suggesting an answer to that, I

consider the relative distance between the three to be a particularly interesting aspect, especially when comparing with how other knowledge centres have evolved. For example, in some places such as larger cities or corridors along major transport routes, scientific and technological settings can appear at a relative large distance from one another while still being considered part of the same agglomeration. In contrast, for example, are the more compact places of knowledge, such as a university campus or technology park, where the different buildings and functions are more densely situated. In comparison, Esrange and the KGO can be treated as part of a developing regional cluster.

Another interesting spatial implication of the rocket base and its impact area concerns the vertical space. The introduction of the rocket technology in Kiruna manifested the physical connection between Kiruna and the vertical space above the earth that had begun with the kite and balloon technologies. Yet, it was not a matter of deep space exploration, but rather exploration taking place in the near space around the earth at limited altitudes. The spatial sphere around Kiruna, with regard to the primary scientific interest and the technological limit, was relatively close to the earth compared to, for example, the lunar probes launched by the United States and the Soviet Union in the late 1950s and 1960s. When talking about Kiruna in terms of geographic expansion, such as the gradual horizontal spread of different buildings and structures, it is also relevant to consider the gradual vertical expansion. Although the two are different forms of expansion, it is interesting how both have occurred in the same place. This chapter showed examples of how the notion of the vertical space and the related rocket technology was used by, not least, the mass media. This is a form of ‘semioticizing’ process, or an ‘articulation of territory’, where certain natural or constructed features of the landscape are used as part of regional—and national—identity building.340

Before closing this chapter, I will remark on how Esrange came to have an impact on the town plan. When Kiruna decided, from the 1940s, to designate new boroughs for the town, one of these new areas was Lombolo, which took form in the 1960s. Many of the blocks and streets in Lombolo were named according to a space theme, for example, blocks named Raketen (The

340Jaworski & Thurlow, see n. 27: p. 7; Sörlin, “The articulation of territory: Landscape and the constitution of regional and national identity”, see n. 27.
Rocket), Norrskenet (The Northern Lights), and Riometern (The Riometer); and streets named Planetvägen (Planet Road), Radarvägen (Radar Road), and Solvindsvägen (Solar Wind Road).

So far, this study has focused on two fundamental aspects of Kiruna’s space activities, namely the research represented by the KGO and the technology represented by Esrange. The next chapter will examine a third aspect that was also of central importance to the history of Kiruna’s space activities—the business ventures.

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341 These street names can be viewed on maps such as those provided by Kiruna Municipality (http://www.kiruna.se) or Google Maps (https://maps.google.com/). In connection with this, it is worth mentioning a 2012 documentary film called Rymdvägen that is about Kiruna, although it is not about space in the sense of outer space but in the sense of empty space. Liselotte Wajstedt, Anna G. Magnúsdóttir & Per Zetterfalk. Kiruna: Rymdvägen. Film. 2013.
Chapter 4

Making place for business: Space House 1979–1986

On 9 December 1969, a group of mining workers in the Svappavaara mine, situated about forty kilometres south-east of the town of Kiruna, started a wildcat strike. The immediate background was a period of growing discontent with a number of factors such as working environments, wages, employers, and the trade union. The Svappavaara mine near the town of Kiruna was part of a region of ore mines in northern Sweden, where the mines were under control by the state-owned mining company LKAB. Within a few days, the wildcat strike spread to the other LKAB mines in Kiruna and became organized, involving about 4,800 workers. A long period of wildcat strikes and intense debates followed, and would continue into the 1990s and involve the Swedish government.\(^{342}\)

Kiruna’s economy was dominated by the large iron ore mining industry. The mines, together with the steel works in Luleå, the coastal city 340 kilometres south-east of Kiruna, formed the backbone of the northern Swedish industry. The Iron Ore Railway Line connected Kiruna to other important nodes, in the west with Narvik on the Atlantic coast, and in the east with Luleå on the coast to the Gulf of Bothnia. Moreover, the LKAB was one of the

most important contributors to the Swedish export market, because much of the iron ore that was shipped from the mines via the ports of Luleå and Narvik went to Europe and the rest of the world.\textsuperscript{343}

The local labour market took a drastic turn between 1976 and the mid-1980s when the LKAB was forced to make thousands of workers redundant.\textsuperscript{344} The Malmfälten (lit. Ore Fields) area, which included Kiruna Municipality and the neighbouring Gällivare Municipality, was in crisis and a large portion of Kiruna’s population was suddenly in need of new jobs.\textsuperscript{345}

In parallel with this negative trend, there were important developments in the national Swedish space industry. A milestone occurred in 1972 through a number of organizational changes in the European and Swedish space industry. The Swedish deal with ESRO was only for the eight years 1964–1972, and when the contract was due for renewal, the leading ESRO member countries wanted to focus more on the practical applications of space technologies rather than the basic research that these technologies facilitated.\textsuperscript{346}

As a result, the Esrange rocket base was transferred from ESRO to Sweden. The Swedish Government formed a new authority, the Swedish Board for Space Activities (Statens Delegation för Rymdverksamhet), to be responsible for the Swedish space activities, and formed a state-owned company Svenska Rymdaktiebolaget AB, more commonly known as Rymdbolaget, that would act as an executive body for this Board. This new development in the space sector would play a central role in the ambitions by Kiruna Municipality to turn its negative fortunes around. Among the initiatives that the Swedish

\begin{footnotesize}
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\item \textsuperscript{344} In 1976 the LKAB had 4,993 employees (and 750 contractors), in 1982 they were 3,738 (150), in 1983 they were 2,470 (150), and by 1987 they were only 1,920 (225). Kiruna Kommun, Effekter av LKAB-krisen 1976–1986, 1987-10-01, Proposition om särskilda åtgärder i Norrbot- ten. Diarien 1987:520 (0000.900). 900 Styrelser nämnder 1987 B. Kiruna Kommun. Kiruna Kommuns Centralarkiv, Kiruna (henceforth cited as KK-Allm24).

\item \textsuperscript{345} It should be noted here that since 1971, Kiruna had been reorganized into the administrative unit of Kiruna Municipality.

\item \textsuperscript{346} Kungl. Maj:ts Proposition 1972:48; Jan Stiernstedt, one of the most central officials in the Swedish space industry at the time, has written a detailed account of the hand-over of Esrange. Stiernstedt, \textit{Sweden in space: Swedish space activities 1959–1972}, see n. 57: pp. 177–192.
\end{itemize}
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Board for Space Activities and Rymdbolaget started in the period after 1972, there is one that is of particular relevance to this chapter. The Board would set up a committee for establishing remote-sensing activities using satellite technology. These organizational changes led to Rymdbolaget planning for new operational activities at Esrange based on such remote-sensing activities.347

Around the same time, the KGO also became reorganised. Until 1973, the Observatory was institute under the Royal Swedish Academy of Sciences. After that, it was organised as an independent state-owned research institute, and its name was changed to Kiruna Geophysical Institute (Kiruna Geofysiska Institutet) (KGI).348

This chapter will show how Kiruna’s efforts to boost its economy became connected with the emergence of the new remote-sensing industry. These business activities turned out to be an essential ingredient in Kiruna Municipality’s deliberate efforts to promote Kiruna as a ‘future town’ where space and computer technologies were of central relevance.

The inclusion of the business aspects in the overall study presented here can be motivated in the framework of ideas about the so-called ‘knowledge society’. The sociologist Daniel Bell argued in 1973 that rather than the traditional economic resources, such as capital, natural resources, and labour, the economic development in such a society was to a greater extent being based on (but not replaced by) information processing where information is treated as goods.349 Ideas such as Bell’s and others like him had an impact on international research politics, especially in the 1980s. In Sweden, it appears that Bell was not discussed until the late 1980s, but as this chapter will show, the phenomenon of the knowledge society was already taking form in Kiruna in the early 1980s.

As a means to boost the economy of Kiruna, there were deliberate efforts

348 Kungl. Majts Proposition 1973/59; Vetenskapsakademiens institutioner : betänkande med förslag om institutionernas framtida ställning m.m., Stockholm: Utbildningsdepartementet, 1972; Hultqvist, Space, science and me, see n. 57: p. 76.
349 Benner & Widmalm, see n. 267: 18f.
to give Kiruna a new epithet that was associated with the new knowledge-based industry. This analysis will show how the different groups of actors involved contributed to this place-making.

In addition, this chapter will also continue to build on the geographical theme where Kiruna’s physical location on the earth was of central relevance to how new space activities and material structures were established there. The chapter will examine, to some degree, how Kiruna’s geographic position mattered to the satellite imaging technologies. In addition, there are brief analyses of two specific technologies that were established in Kiruna and are relevant for the overall study: a network of radar antennas and a network of camera houses. Included in this chapter is also a short section on how the first Swedish satellite—the Viking satellite—was relevant to the place-making.

FROM MINE TO MIND

MINE CRISSES

A lot can be said regarding how the mine crises in Kiruna contributed to changing the atmosphere in the local industry. To provide context for the remainder of this chapter, it is relevant to include some background about these early events.

When ore production declined in the mid-1970s, many people left Kiruna to find jobs elsewhere. Figure 4.1 shows a correlation between the population development in Kiruna Municipality and the iron ore production in Sweden. As the graph suggests, this was not just a local problem but also a national matter.350

Since the early twentieth century, a spirit of radicalism had been dominating local political matters. The LKAB wildcat strikes also spread to other industries around Sweden and had a serious impact on the Swedish labour

350 Kiruna Municipality was not formed until 1971, but it is possible to find the population data for the corresponding geographical areas prior to that by adding the population figures for the Jukkasjärvi and Karesuando parishes and rural court districts. Peder Nielsen. Kommunindelning och demokrati: Om sammanläggning och delning av kommuner i Sverige, Skrifter utgivna av Statsvetenskapliga föreningen i Uppsala 157. Acta Universitatis Upsaliensis, 2003, p. 367: pp. 347–351.
market throughout the 1970s. The so-called Spirit of Saltsjöbaden, mentioned in the previous chapter, took a serious hit from these strikes.351

In a wider context, researchers have argued that the strikes were rooted in, and symbols of, a radical ideology that challenged capitalism and the Swedish model.352 Labour radicalism had been rooted in Kiruna since the turn of the century, not least through the mining union known as Gruvtolvan. Radical journalists and authors played a significant role in channelling the cause of the strikes. One of these authors was the well-known northerner Sara Lidman (1923–2004), who shortly prior to the 1969 mining strike had written a book that portrayed the working conditions in the Kiruna mines.353

It is important to understand the development in Kiruna within the broader economic and industrial context. Between the late 1940s and the early 1970s there had been a period of economic prosperity in Sweden. Even the north of Sweden, which experienced a reduced population when many jobs were lost because of the mechanisation of agriculture and forestry, experienced a boom. There was optimism in the region, not least with regard to the iron processing industry, which was of central importance to Kiruna.354 For example, the state-owned steelworks company Norrbottens Järnverk AB expected the boom to continue and consequently in 1973 presented plans to expand the steel works in Luleå. Because this project would be completed by 1980, it was referred to as Steelwork 80 (Stålverk 80).355

However, the situation in the international economy changed drastically due to the 1973 oil crisis. This had consequences for the international steel industries, which were restructured to cope with the crisis. The national Swedish economy entered a period of recession from the middle of the 1970s. The Swedish Government acted to restructure, rationalise, and renew those in-

351 Schön, En modern svensk ekonomisk historia : tillväxt och omvandling under två sekel, see n. 95: p. 347.
354 Schön, En modern svensk ekonomisk historia : tillväxt och omvandling under två sekel, see n. 95: 43ff.
dustries that were suffering the most, including mining, steelworks, shipyards, and pulp industries. Consequently, it dismantled the Steelwork 80 project.356

There were specific efforts to stimulate the regional economic growth in Norrbotten County. Examples included the transfer of Norrbottens Järnverk AB, together with two other Swedish steel industries, to the new state-owned steelworks company Svenskt Stål AB, more commonly known as SSAB; the setting up of an investment trust Regioninvest to stimulate industries in the north of Sweden; and the establishment of the Regional Development Fund for Norrbotten County (Utvecklingsfonden i Norrbotten).357

In 1976, the Minister of Industry Nils G. Åsling (b. 1927) summoned a government commission for regional industrial development known as the Norrbotten County Delegation (Norrbottendelegationen) to find concrete solutions to the employment problems specifically in the Norrbotten County.358 Thus, the scope of the problem is evident from the fact that the government was deeply involved.359

For Kiruna, the crisis became a serious problem in the early 1980s when about 3,000 mining employees—or sixty per cent of the labour force—were made redundant. This had severe consequences for most of the Municipality and its residents. Many people moved away to find jobs elsewhere, and this reduction in the population had further negative consequences for those who stayed behind.360

356 Schön, En modern svensk ekonomisk historia : tillväxt och omvandling under två sekel, see n. 95: p. 490.
357 The full name of Regioninvest was Regioninvest i Norr AB, but its first name was NJA-invest AB. For the Regional Development Fund, see Regerings Proposition 1977/78:40. om åtgärder för att främja de mindre och medelstora företagens utveckling; For the more specific efforts aimed at the mining and steelworks industries, see Regerings Proposition 1976/77:125. med förslag om tilläggsbudget III till statsbudgeten för budgetåret 1976/77. Regerings Proposition 1977/78:87. om statligt engagemang inom handelsstålsmiljön, m. m. Schön, En modern svensk ekonomisk historia : tillväxt och omvandling under två sekel, see n. 95: p. 491.
359 For some academic studies of these problems, see Helén Anderson & Gunnar Hedlund. Alternativa framtider för Malmfälten, Stockholm: Handelshögskolan, Institutet för internationellt företagande, 1981; and a later study was Liljenäs, From mine to outer space : the case of Kiruna, a town in northern Sweden, see n. 50.
360 Ingrid Liljenäs. 'From mine to outer space: the case of Kiruna, a town in Northern
In 1981, the government summoned the Ore Fields Commission (Malmfält-sutredningen), which was assigned the task of analysing the financial consequences of various alternatives to the mining industry to investigate how to secure the long-term future of the region.\(^{361}\) The mere fact that such a prominent push was required from the higher national powers is an indication of how severe the situation was. The results of the Commission were bleak but highlighted the problems: a focus on a single industry, an isolated geographical location, and a decreasing population. There were also fears that the problems would spread to neighbouring regions.\(^{362}\) Thus, it was the responsibility of the Commission to review all visions and ventures in the region.

The employees of the LKAB could follow these developments closely through the *Veckobladet* newsletter.\(^{363}\) The rest of the local residents of Kiruna were informed primarily through the regional newspapers as well as through brief regional broadcasts on the national radio and television channels. In addition, Kiruna Municipality initiated a local half-yearly paper called *Kiruna Information*.\(^{364}\) This paper provided the residents with an update of the matters relating to, among other things, the mine crisis and its consequences for the Municipality. For example, the very first issue had an interview with the new head of the municipal council, Gunnar Pettersson (1922–2007). He tried his best to be optimistic considering the difficult time the Municipality was going through, and he explained how it was up to all inhabitants to make

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\(^{362}\) Malmfält-sutredningen, see n. 361.

\(^{363}\) There were two newsletters called *Veckobladet*, one for Kiruna and one for Gällivare. For the Kiruna version, see *Veckobladet : information för anställda inom LKAB, Kiruna*. Kiruna, 1977.

an effort: ‘We must roll up our sleeves and go for a development outside the
mines.[…] No chance is too small to risk losing. Each job counts.’ The
fact that there was a need for such a local information channel was also an
indication of how serious the problem was, but perhaps it also suggests that
the regional and national press were inadequate.

**INFORMATION TECHNOLOGY COMES TO TOWN**

Various initiatives to start up, or to inspire to start up, new businesses would
turn out to be an important part of Kiruna’s economy and politics. A num-
ber of companies based on the new information technologies were initiated
starting in the early 1980s.

One such company was the service centre known as Servicecentralen i
Gällivare AB. This was an initiative supported by the Swedish state to tackle
the problems with Kiruna’s textile industry, which was another industry that
suffered difficulties in the 1970s and early 1980s. When a large local textile
company was discontinued, about forty to fifty people lost their jobs. The
Swedish Parliament together with the director-general of the National Labour
Market Board decided in 1979 to set up a new computer-based business in
Gällivare as part of a national effort. The first thirty employees were female
dressmakers from the textile company. Servicecentralen i Gällivare grew and
by 1981 it decided to establish an office in Kiruna, and later also in Stockholm.
By the mid-1980s, it had ninety employees, of which over twenty were based
in Kiruna and over sixty in Gällivare. The company performed data registra-
tion and processing, word and text processing, microfilming, printing and
photography, and logistics. It is notable that it was Gällivare rather than
Kiruna that was chosen as the initial place for its offices. However, it would
eventually relocate to new office buildings in Kiruna.

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365Original quotation: ‘Därför gäller det nu att kavla upp skjortärmarna och satsa på en
utveckling utanför gruvorna.[…] Ingen chans är för liten att slarvas bort. Varje jobb är viktigt’,
367Liljenäs, *Från gruva till data och rymd: småföretagens utvecklingsbetingelser i Malmfältet*,
see n. 50: pp. 130–139.
Another company based on information technology that settled in Kiruna was the consulting engineering agency Allmänna Ingenjörsbyrån (AIB), which had started in Stockholm in 1901. In the 1950s and 1960s, the AIB had done consulting work for the LKAB and had had an office in Kiruna. Due to lack of orders, the AIB had to relocate to Luleå, but by 1983 the company once again set up an office in Kiruna, partly because of state funding but also because of the technological and commercial factors. The AIB was experienced in computer-based CAD/CAM technologies, which was useful for the mining industry, but their activities also included areas such as mechanical construction work, mapping, geodesy, education, and computer scanning, and the company would collaborate not only with the LKAB but also with the KGI, Satellitbild, Svenska Rymdbolaget (Esrange), and other businesses in the region. For example, the AIB developed a three-dimensional model of a particle instrument, they evaluated and programmed computer systems for Rymdbolaget, and they rescaled maps for Satellitbild. Initially, the AIB had thirteen employees in the Kiruna office, and by 1984 there were twenty. In addition to these two companies, there were a number of other information technology companies that started up in Kiruna in the 1980s and later.

The post-industrial society

This sudden emergence of information technology firms in Kiruna’s industrial sector can be considered part of larger structural changes in Swedish and Western society as a whole at the time. According to this line of thought, Sweden, like many other industrialized countries, was in the process of changing from an industrial society to a so-called post-industrial society. In this societal form, also referred to as an information or knowledge society, the industrial production is largely replaced by the service sector, much like the agricultural society had been superseded by the industrial society in some parts of the world. An important contribution to this structural change into a knowledge society was the electronic revolution with the telecommunications, computer, and information technologies that had rapidly developed in the post-war

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368 Liljenäs, Från gruva till data och rymd: småföretagens utvecklingsbetingelser i Malmfältén, see n. 50: pp. 140–145.
period.\textsuperscript{369} Sweden was, at an early stage, among the world’s leading nations in the emergence of the new computer technology field.\textsuperscript{370} In Sweden, a number of computer technology based knowledge centres emerged. For example, in 1983, the newspaper \textit{Dagens Nyheter} pointed out six municipalities that were putting stake in becoming the next Swedish ‘Silicon Valley’: Kiruna, Luleå, Timrå, Kista, Linköping, and Lund.\textsuperscript{371}

These structural changes carried with them visions of how the new technologies could be used. Economic growth, welfare, and democracy were seen as areas that could benefit from such technologies.\textsuperscript{372} For example, several governmental investigations in the 1970s and 1980s explored how the ‘new media’—which included computers, television and telephone technologies—could contribute to increased democratization.\textsuperscript{373}

Similarly, there was a governmental interest in how the industry sectors could benefit from these technologies. As a result, in 1980 the govern-


\textsuperscript{372} Benner & Widmalm, see n. 267: pp. 18–21.

ment formed the Swedish Commission for Informatics Policy (Datadelegationen). For the fiscal year 1982/1983, the government granted ten million Swedish kronor to support broader education in computer matters. Of these, six million Swedish kronor were assigned to the National Board of Education, which in turn financed a number of computer study groups. The rest, four million Swedish kronor, was assigned to the Swedish Commission for Informatics Policy.

Part of the structural changes included debates regarding the decentralisation of administrative tasks. Instead of having everything concentrated in Stockholm, the capital of Sweden, some tasks could be delegated to other regions in Sweden. The new computer technologies could make such decentralisations possible and thereby benefit the businesses of the regions. Besides a focus on businesses, there was also an interest in how consumers could benefit from these technologies. For example, the Swedish Commission for Informatics Policy investigated to what extent the new class of affordable and accessible home computers could be used to diffuse public information to households. This was part of the national political vision later referred to as ‘the good computer society’.

**Satellite Imaging**

As mentioned earlier, the state-owned company Rymdbolaget was formed in 1972 as an executive branch of the Swedish Board for Space Activities. The company expanded its rocket activities in the 1970s, and later other branches were added such as balloon experiments and processing of satellite data. In 1982, Rymdbolaget formed a subsidiary company to do business in satellite...
imaging, or remote-sensing imaging as it was also known. In order to show how there was a need for such a company, the subsections below provide a background to the satellite-imaging activities.

**COMMERCIAL SATELLITES**

Various properties of outer space make it a more suitable environment for certain research compared to what is possible to achieve using ground-based instruments. One such activity is the observation of earth from high altitudes in order to map out and survey processes in the atmosphere or on the surface. While meteorology ‘deals with atmospheric phenomena and processes’, remote sensing is defined as ‘the automatic acquisition of information about the surface of the earth or another planet from a distance, as carried out from satellites and high-flying aircraft’.\(^{378}\)

Internationally, satellites have been a breakthrough in the space industry with many applications. When it comes to remote sensing, one of the main articulated motivations has been the use of satellites to observe actual or potential environmental problems. Rather than observing outer space, the focus had shifted to observing the earth. This change of perspective was in line with the notion of the ‘Whole Earth’ perspective studied by historian Neil Maher. His main argument was that the narratives about the two famous photographs of earth taken in 1968 and 1972 had changed from focusing on the nature ‘out there’ to focusing on the nature here on earth: ‘The process began in earnest in 1972 […] when NASA launched its first Landsat satellite to help examine ecological changes from soil erosion and deforestation to ocean dumping, air pollution, and urban sprawl.’\(^{379}\)

In the first era before the turn of the decade in 1970, the focus of the space engagement in Kiruna was primarily on the near space around earth, but the perspective of earth’s environment would change to also include land and sea. However, there is also another aspect of this change, the commercialization of

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nature. The story of changed perspective is incomplete without including the commercial interests, and on a broader scale this is also a matter of achieving and displaying technological excellence and power.

Remote sensing was also discussed early in the UN. For example, in 1971, the Swedish UN ambassador and head of Swedish Broadcasting Corporation Olof Rydbeck (1913–1995) talked to the UN about how the first decade in space had opened up completely new fields of human activity, and that it was time to use this new knowledge for the benefit of humankind.\footnote{Note that this study also mentions another person by the same name; the technologist Olof Rydbeck (1911—1999).}

If we are going to prepare an endurable existence for everyone, we must house- hold carefully with earth’s natural resources. We know that only six per cent of earth’s surface has been topographically mapped […] But now more than ever we must have maps to continuously be able to take stock of the physical factors that affect the air we breathe, the water we drink, the land we farm, the forests we fell, the minerals we extract, the industries we operate, the connections we use for transport and communications, and the societies we live in.\footnote{Skall vi kunna bereda en dräglig tillvaro åt alla måste vi hushålla å det noggrannaste med jordens naturtillgångar. Vi vet att bara 6 procent av jordens yta är topografiskt kartlagd […] Men nu mer än någonsin måste vi ha kartor för att fortlöpande kunna inventera de fysiska faktorer som påverkar den luft vi andas, det vatten vi dricker, det land vi odlar och de skogar vi avverkar, de mineraler vi utvinner, industrierna vi driver, de förbindelseleder vi använder för transport och kommunikationer och de samhällen vi lever i, Utikesfrågor : offentliga dokument m m rörande viktigare svenska utrikesfrågor 1971, Aktstycken / utgivna av Utrikesdepartementet. Ny serie. I:C 21. Utrikesdepartementet. Stockholm: Allmänna förlaget, 1972: p. 132.}

Rydbeck continued to talk about the effects of the increasing consumption of natural resources and the challenge of providing the growing population with food and water. Satellite imaging could play an important role in this development:

Satellites will help humankind in her battle against environmental destruction and will contribute to establishing a balance between discovery and extraction of natural resources on the one hand and environmental preservation measures on the other hand. They can be used not only to collect scientific data such as weather, fish presence in the seas, or natural resources under the surface of earth, but also to predict the long-term changes of these and related phenomena.
and thereby contribute to achieving or preserving ecological balance on a local, regional, or global basis.\textsuperscript{382}

Thus, Sweden played an active role in the politics concerning the civilian use of satellites. In his capacity as the head of the Swedish Broadcasting Corporation, Rydbeck likely had a specific interest in the satellite technology because of its potential for radio technology. In addition, the government supported this connection between the mass media and satellite technology.\textsuperscript{383}

**THE FIRST SWEDISH COMMITTEES**

By the end of the 1960s, there was a new, more active initiative to strengthen industrial politics in Sweden. As a result, the Ministry of Industry was formed in 1969.\textsuperscript{384}

An important step towards the Swedish remote-sensing programme was taken in April 1969 when the National Board for Technical Development (Styrelsen för Teknisk Utveckling) formed its Remote Sensing Committee (Fjärranalyskommittén).\textsuperscript{385} The background was that advanced military reconnaissance techniques had been opened to civilian use, and while meteorological satellites were already using this new technology, remote-sensing

\textsuperscript{382} Original quotation: ‘De [satelliterna] kommer att hjälpa människan i hennes kamp mot miljöförstöring och kommer att bidra till att uppnå en balans mellan upptäckt och utvinning av naturtillgångar å ena sidan och miljöbevarande åtgärder å den andra sidan. De kan användas inte blott för att insamla vetenskapliga data som exempelvis väder, fiskförekomster i haven eller mineraltillgångar under jordytan utan också för att förutsåga de långsiktiga förändringarna av dessa och närbesläktade fenomen och såtillvida bidra till att uppnå eller bevara ekologisk balans på lokal, regional eller global basis’, ibid.: p. 133.


satellites were still in the planning phase. The United States was working on the ERTS-1 satellite, later named Landsat. In Sweden, the Research Institute of the Swedish National Defence and the institutes of physical geography at Stockholm and Lund universities were experimenting with this new technology. Because there was a need to coordinate the work and establish a policy for the new field, the Remote Sensing Committee was formed for this purpose.\(^\text{386}\) However, in 1972, the National Board for Technical Development was reorganized and the Remote Sensing Committee was discontinued because remote sensing was no longer on the agenda.\(^\text{387}\)

By the time of the handover of Esrange from ESRO to Sweden, the rocket base was only used for sounding rocket launches, but when the responsibility was handed over to Rymdbolaget, the idea was to broaden the operations at Esrange. Among other plans that Rymdbolaget had was to continue the remote-sensing initiatives. Such advanced surveillance operation required a well-planned and engineered infrastructure, with ground-based instruments for transmitting data to and from the space instruments, as well as facilities to launch the equipment into space. Although Esrange could not provide sufficient launch facilities, the base was particularly suitable for providing the ground-based transmission facilities. Esrange had skilled engineers and a basic space-oriented infrastructure that allowed for expansion. Another reason Kiruna was considered an obvious choice for ground-based communication with satellites was that the town was situated inside the north polar circle, which meant the polar satellites—such as the ones used for remote sensing—would often be directly overhead the area.\(^\text{388}\)

Also in 1972, the Swedish Board for Space Activities formed the Remote Sensing Committee (Fjärranalyskommittén).\(^\text{389}\) The Remote Sensing Com-


mittee later set up a number of advisory boards to focus on applications such as imaging land, water, oil spills, and air and later also data processing. In its long term plan, the Remote Sensing Committee also suggested to the Swedish Board for Space Activities a national programme for remote sensing while Rymdbolaget would execute the applications and handle the instruments.390

The first satellites

Because Esrange was well suited for sounding rockets, the first experimental launch that involved remote-sensing technology used a British sounding rocket design called Skylark equipped with the only available Swedish remote-sensing instrument at the time, the Hasselblad camera. The experiment, which was a collaboration with Great Britain and Germany, took place in 1973 at Esrange in Kiruna. Its purpose was to map vegetation and survey rangeland, in particular reindeer pastures, in northern Sweden.391 Although this experiment failed, it was just one of many experiments organized by Rymdbolaget in the period 1972–1976 with the aim to demonstrate the new technology to prospective customers. Among those interested were the Coast Guard, the Swedish Environmental Protection Agency, the Swedish Maritime Authority, the SMHI and the Swedish National Land Survey (Lantmäteriverket). The rocket engineer Sven Grahn (b. 1946) and the former CEO and President


of Rymdbolaget Claes-Göran Borg (b. 1945) wrote in retrospect how it was their ‘firm belief that experiments like these opened the eyes of people for the operational use of Remote Sensing’.\(^{392}\)

In 1975, Rymdbolaget took its first step towards commercializing its remote-sensing activities.\(^{393}\) It started when the SMHI had measured water temperatures at outlets from nuclear power plants by using an airborne infrared radiometer. Knowing that an infrared line scanner would be better, the SMHI involved Rymdbolaget to find out what options were available, because the existing scanners were far too expensive for the SMHI alone. Rymdbolaget saw an opportunity to become more deeply involved by financing part of the scanner and by operating the system. Thus, Rymdbolaget became a partner with the SMHI.

The first civilian remote-sensing satellite was ERTS-1, later renamed to Landsat 1, that was launched by the United States in 1972.\(^{394}\) It was a big success and stations were established around the world to download data from it. In September 1976, Rymdbolaget decided to establish a Landsat station at Esrange.\(^{395}\) In a memo from the Ministry of Foreign Affairs, the motivations for this station were:

1. to secure the activities and employment at Esrange because of expected long term reductions in the sounding rocket activities,
2. to protect the investment in Esrange worth around fifty million Swedish kronor,
3. to contribute to the regional development in Norrbotten, above all through psychological stimulus, and
4. to contribute in the long run to keeping Swedish research and development at such a high level that Sweden could match international competition on the industrial side.\(^{396}\)

\(^{392}\) Grahn & Borg, see n. 386: p. 40.


\(^{396}\) Original quotation: ‘1) att säkra verksamheten och sysselsättningen vid Esrange eftersom man kan räkna med att sondraketverksamheten kommer att minska på längre sikt, 2) att
Worth noting here is that the satellite station was thought to contribute on a local, regional, and national level. Data acquisition started in May 1978, and the official inauguration of the Esrange Landsat Station took place on 14 June 1979.\(^{397}\)

There were also plans for a European remote sensing satellite. France presented their commercial SPOT satellite project in 1977, and because France was a member of the European Space Agency (formerly ESRO), the other member countries were offered to join the project, but in the end Sweden was the only partner. A contributing factor was that the French saw Sweden as a natural partner because of the existing satellite station at Esrange.\(^{398}\)

Sweden, which signed the contract on 8 November 1978, would participate with four per cent by letting the company Saab-Scania (formerly SAAB) build the on-board computer. In return, Sweden obtained the right to freely acquire data from the satellite in correspondence to the four per cent participation.\(^{399}\)

The SPOT satellite was a polar satellite, which meant it circled around the earth by passing over the North Pole and South Pole, approximately following the longitudinal lines. The other type of satellite was called geostationary, where the satellites circled around the equator at the same rate as the earth rotated, making the satellite appear as if it were standing still above the same spot on the ground. The SPOT satellite would pass over Kiruna approximately ten times per day, which was about three times more often than it passed over the


other spot ground station located at Toulouse in France, which was much farther from the North Pole. During each of these orbits, the satellite was visible from Kiruna for about a quarter of an hour and the ground station at Esrange could receive, via a radio link, all the data the satellite had collected and recorded in its entire trip around earth. Because of the rotation of earth, the satellite would pass different longitudes on each round trip, and it would take twenty-six days to cover the entire globe.\footnote{F Engström och S Senker, Fjärranalyscentrum i Kiruna – en realistisk målsättning, ES1-2, 1981-01-20. Centralarkiv. Swedish Space Corporations arkiv, Stockholm (henceforth cited as SSC-Centralarkiv2): pp. 19–20.}

This orbital pattern of the polar spot satellite is particularly relevant to Kiruna. Kiruna’s location relatively close to the North Pole was an important advantage compared to the more southern station in Toulouse. Thus, the geographical location mattered, much like it did in the decision to place the KGO and Esrange in Kiruna. In the site selection of the KGO and Esrange, Kiruna’s location in the so-called auroral zone was of central importance, in addition to other factors. Here, with the satellite imaging, the importance of the auroral zone was not important. Instead, it was Kiruna’s location near the North Pole that mattered most.

**TURNING THE TREND**

**THE KIRUNA PROJECT**

As an attempt to reverse the negative trend in the economy, Kiruna Municipality initiated a project group in 1979 called the Kiruna Project (Kirunaprojektet) that consisted of local representatives of the Regional Development Fund, Regioninvest and the LKAB.\footnote{Kommunfullmäktige, Sammanträdesprotokoll, Kf §335 ang. Projektgrupp för företagsutveckling inom kommunen, 1979-11-19. Vol 1. Kiruna-projektet. Kiruna Kommuns Centralarkiv, Kiruna (henceforth cited as KK-KP1).} More specifically, the goal was ’to strengthen the present situation of the existing companies’ and ’to differentiate the industrial structure and reduce the dependency on the mining industry’, something that concerned the politics of all of Norrbotten County.\footnote{Original quotations: ‘att stärka företagens nuvarande situation’ and ‘allt med målinriktning mot en differentiering av industristrukturen samt minskad avhängighet av gruvnäringen,’ Rolf}
Kiruna Project functioned like an umbrella project for many smaller initiatives that focused on areas such as innovation, marketing, and knowledge exchange.

One example was the KGI-project (KGI-projektet), which was a collaboration between the KGI, the Norrbotten County Administration, Kiruna Municipality, the Regional Development Fund, and Regioninvest. Although the primary focus of the KGI was in space physics research, the Institute also did research in other areas. The space physicist Ludwik Liszka (b. 1935), who had worked at the KGI since 1958, initiated research in sound waves or, more precisely, mechanical infra-acoustic waves, which were atmospheric waves with frequencies below the audible range.

Liszka’s research into sound would turn out to become part of a commercial product development at the KGI. In a 1979 memorandum, Bengt Hultqvist suggested a number of products they could work on. The first product was going to use ultra sounds to determine the quality of timber. According to Hultqvist, such research was already taking place at the KGI on behalf of the wood industry, and he claimed there were no other methods that could match their method. The second example was a method to detect in real time the character of mountains by analysing the sound of drills. Such a method could replace the current expensive method. The third product that he mentioned was a method for rapid determination of the quality of pebbles through acoustic analysis. In addition to these methods, he also hinted at other potential uses of mechanical vibrations, although he admitted they were

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Liszka wanted to study whether the aurora was a source for infra-acoustic waves in the atmosphere. To facilitate this research, the KGI installed sensors not only in Kiruna but also in other parts of northern Sweden: in Lycksele in the Västerbotten County and on the island Jämtön in the Norrbotten County. In addition, he led the research activities at the KGI’s laboratory for mechanical waves situated in Sörfors, also in Västerbotten County. Hultqvist, *Space, science and me*, see n. 57: 71f.
far too undeveloped to be explicitly mentioned at the time.405

Thus, Liszka’s work with the sound vibrations can be seen as a spin-off from the space research. As a result of this research, and supported by the Kiruna Project, a group of people in leading positions at the KGI, Esrange, the Luossavaara mining research project, and the Kiruna-Mec organisation together formed, in their capacity as individuals rather than representatives of these institutions, a Kiruna-based electronics company called Keltronic AB, short for Kiruna Electronic AB.406 The idea was to utilise and develop product ideas and the spin-off effects of research in the field of electronics.407 However, although Kiruna Municipality supported the Keltronic company with some funds, the business was not profitable.408

Another initiative that was part of the larger Kiruna Project was a project called Future in Kiruna (Framtid i Kiruna), which was initiated in early 1982.409 Its purpose was to offer free education to those who wanted to start their own business. In addition to the education, there was also an information campaign that was financed by the Kiruna Project. The project was led by the municipal commissioner Lars Essling (b. 1935) and included representatives from Kiruna Municipality, the Ministry of Industry, the LKAB, the County Employment Board in Norrbotten (Länsarbetsnämnden), the Swedish Federation of Crafts and Small and Medium-Sized Industries (Sveriges Hantverks- och Industriorganisation), the Regional Development Fund, and the two national trade unions TCO and LO.410

408 Hultqvist refers to the company as Keltronics but in the Kiruna Municipality records it is written as Keltronic. Hultqvist, Space, science and me, see n. 57: p. 72.
409 The project was more commonly known as the Start Your Own Business (Starta Eget) education.
The idea of the project was similar to that behind the nationally well-known concept of the Spirit of Gnosjö, which was characterised by enterprising and networking in a region in southern Sweden. Both these concepts were part of the same spirit of the age. In the post-war period, the number of industrial firms increased in the Gnosjö region from about 30 to about 300.411

In the context of such structural changes, it is easy to understand why politicians, entrepreneurs, and the public in Kiruna would be optimistic about the potential of the new information and space technologies. Until then, these technologies had been limited to a few local companies.412 For example, the mining company LKAB was a pioneer in computing, having used computers since the middle of 1960s.413 In other words, it was mostly a matter of making the people of Kiruna aware of and interested in these opportunities. The Future in Kiruna project was an ambition to nudge people in this direction.

VISION 84: THE FIRST CONFERENCE

Another project alongside the Future in Kiruna project and part of the larger Kiruna Project was Vision 84, which was about presenting the opportunities in the computer and information technologies as a way forward for the local economy. These ambitions culminated in a conference. The plans appear to have started in October 1982, and the project was formally approved by the Municipality in 1983.414

The constituents of the project were Kiruna Municipality, the Ministry of Industry, and the Swedish Commission for Informatics Policy. Thus, this

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412Liljenäs, Från gruva till data och rymd : småföretagens utvecklingsbetingelser i Malmfälten, see n. 50: p. 109.


project was of concern not just locally but also on a national level, and it was of interest to the government to be involved in computer-related matters, which is why the Swedish Commission for Informatics Policy was represented.

Thor Svensson (b. 1942), a consultant working for Kiruna Municipality, was the leader of the project. Three other important persons were Essling, the economic geographer Bengt Sahlberg (b. 1938), and the consultant Victor Epstein (b. 1924). Sahlberg was at the time working at the Nordic Institute for Studies in Urban and Regional Planning (Nordiska institutet för samhällsplanering) where he was doing research in communications, such as polar satellites, and planning the Nobel Centre (Nobelcenter) in Stockholm. Epstein had spent ten years in Kiruna working on different projects, including being responsible for the mining prospects in the Svappavaara area. He got in touch with Sahlberg to ask if he wanted to join the project and participate in a visit to the English town of Milton Keynes, just north of London. The British Government had deliberately planned it as a ‘new town’ with the ambition to relieve housing congestion in London. Thus, it was important to make Milton Keynes become self-sustaining.415

Epstein and Sahlberg went to Milton Keynes from 26 February to 1 March 1983 and met the British computer expert David Firnberg (1930–2013), one of the founders of the community.416 What made Milton Keynes particularly interesting to representatives of Kiruna was its successful approach to becoming a centre for information technology businesses. A number of Swedish companies had even established offices there.417 Because the activities in Milton Keynes focused on information technology and might seem of less relevance

416 Although not many archive documents concern the study visit, or what the Swedish delegates hoped to learn from it, the general idea can be pieced together from available documents and other sources, such as contemporary radio broadcasts and newspaper articles as well as recent interviews. The documents concerning Vision 84 are spread out over different archives, including, for example, Kiruna Municipality’s official archives and the private collection of Thor Svensson. Moreover, some details that are missing in the documents have been extracted from radio broadcasts. Bengt Sahlberg. Interview. 2011-08-05.
to the space industry in Kiruna, it is important to explain how the English example became an inspiration for the representatives of Kiruna. As will be shown, Kiruna’s approach would integrate information technology with space technology.

This study tour was part of a tradition where city officials travelled to other cities to find inspiration. For example, as early as the late nineteenth and early twentieth centuries, travels by Helsinki officials with the purpose of observing and comparing the know-how of other cities enabled the local authorities to quickly adopt new innovations, while also being cautious and selective with respect to the potential problems and challenges that the new technical solutions would bring. With that approach, the Helsinki authorities hoped to develop Helsinki much like London, Paris, Berlin, and other large cities. When the Kiruna Municipality officials were looking at places like Milton Keynes and Silicon Valley, it was essentially the same kind of idea—to copy a successful model. Other places in Sweden also adopted similar concepts such as science parks or science villages. Some early Swedish examples include Luleå, Timrå, Linköping, Kista in Stockholm, and Ideon in Lund. In the media, this was sometimes described in terms of competition between the different places that wanted to profile themselves as the Swedish Silicon Valley.

Later that year, Svensson explained in a radio interview his perspective on why the time was ripe for a conference of this type:

I believe hardship forces people to become more open-minded, to act freely. I also believe this applies to Kiruna today to some extent. It’s not so difficult to connect this with education once it’s been decided that computer technology is an area to develop. I think the threat of unemployment and workforce reduct-

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421 DN-1983-11-07, see n. 371.
tion benefits this development. I don't want to say it's a necessary prerequisite, but I think it helps to make possible a restructured economy in Kiruna.422

When Svensson presented Vision 84 to the municipal council, he provided a document which outlined very briefly the goals of the project. The purpose of Vision 84 was to highlight the changing society with humans in the centre through means of strategy, education and training, and technological applications and communications. Vision 84 was aimed at ‘users of new technology among decision makers, researchers, education governors, community planners, and representatives of manufacturers and producers of hardware and software.’423

Vision 84 consisted of two conferences that were held in Kiruna.424 The first took place during 12–13 September 1983, and the second during 3–5 September 1984. Regarding the first conference, a useful document is a conference brochure that reveals both the marketing aspect and the underlying ideas and visions involved.425 Based on the material that I have had access to, this is the most comprehensive document with regard to the ideas behind the conference. It is produced by Svensson, with the help of a marketing firm. It should be stressed that this was a form of bulk mail advertising, which tends to be written in a glossy manner with the purpose to convince people of something—in this case, convincing people to visit the conference. However,


424Both were officially referred to as symposia and seminars.

because the present study largely concerns ideas about the ‘space town,’ it is relevant to also include this form of document, even if it might be questionable as a reliable source for how the conference was actually planned.

According to the brochure, the marketing aspect was important to Vision 84. The Top of Europe concept filled a central role, and is relevant to study in some detail. When part of the 1983 Alpine Skiing World Cup was going to be hosted in Sweden, a marketing group bought all commercial rights to the World Cup event and managed to make deals with over fifty companies from Norrbotten County who all unified under the Top of Europe concept. This World Cup weekend was a successful event, not least because of the large audience who had gathered to see their favourite participants, like the Swedish skier and Olympic gold medallist Ingemar Stenmark (b. 1956), a symbol for Norrland. The media coverage was impressive. As a result, the people behind the Top of Europe concept realised that more could be done.

This is where Vision 84 entered the picture. While the World Cup was a combination of sports, tourism, and marketing, Vision 84 was going to combine tourism and marketing with business, with a focus on information and space technology ventures. According to the brochure, ideas and initiatives, or thoughts and actions, would strengthen the confidence of the region. It was about stability and prosperity, something that was no longer possible to achieve with the mine alone: ‘Old industries change, even die. New ones grow up. Yesterday the society was based on wood and ore. In the future, prosperity will be based on new high technologies—a transformation of society with mankind at the centre.’

This text passage reflects the larger societal ideas at the time about structural changes in the post-industrial economy.

The goal to develop Kiruna was not only about the ‘hard’ technology. At the centre was the ‘soft’ human being, and the information technology was described as a means to achieve this goal, rather than controlling it. How this would turn out was up to the inhabitants of Kiruna:

Only you and I can together decide how it will really turn out... regardless of

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426 TS-Vision, see n. 425.
428 TS-Vision, see n. 425: p. 6.
what the scientists do, the authors write, the politicians say, and the forward-looking conferences suggest... Only you and I can come to grips with the future. It belongs to us! And our children...439

In connection with this, the Vision 84 brochure drew a parallel with the futuristic visions of the American author Alvin Toffler (b. 1928) and the British author George Orwell (1903–1950). Toffler’s optimistic vision of information technology as an instrument, among many others, that would contribute to bringing humankind into the third wave following the agricultural and industrial society was contrasted with Orwell’s pessimistic vision of a power-hungry ending for the future of humanity. It seems that Vision 84 was about embracing technology, while also keeping in mind the risks involved. Those who wanted to push for such technological developments found it important to reassure the public that the human dimension was not going to be ignored:

Perhaps things will develop in Kiruna like they have done in Silicon Valley: high-tech gives birth to a longing, a need for high touch. Information technology reshapes Kiruna into a new city full of warm bubbling whirlpools, where information technology users sit together and enjoy physical contact and human talk.430

As the quoted passage indicates, the notion of changing Kiruna through information technology was not about isolating people from each other. Rather, it was about allowing people to connect with each other across vast distances, something that was now possible with the new information technologies. The theme of the conference was ‘The human in the centre’.431 The idea was that scientists, entrepreneurs, and the media would be able to take advantage of

439 Original quotation: ‘Bara du och jag tillsammans kan bestämma hur det egentligen ska bli... alldeles oavsett vad forskarna gör, författarna skriver, politikerna säger och framtidssymposierna anar... Bara du och jag kan ta tag i framtiden. Den tillhör oss! Och våra barn...’ (Suspension points in original), TS-Vision1, see n. 425: p. 6.

430 Original quotation: ‘Kanske blir det i Kiruna som i Silicon Valley: att “high-tech” föder en längtan, ett behov efter “high-touch”. Att datateknologin omdanar Kiruna till en stad fylld av varma, bubblande whirl-pools där datamänniskor tillsammans sitter och njuter av kroppslig kontakt och mänskligt prat?’ (English words in original. It should be added that in the Swedish language, the word ‘data’, which means ‘information’ is often wrongly used to mean ‘computer’. The Swedish word for computer is ‘dator’.), TS-Vision1, see n. 425: p. 7; Sveriges Radio (SR). Nyhetsmorgon P1. Radio broadcast. 1983-09-12.

431 Original quotation: ‘Människan i Centrum’, TS-Vision1, see n. 425.
experiences that other cities—like Silicon Valley and Milton Keyes—had gone through in the process of changing from machine-based industrialism to the information-based high technology.

It should be emphasized that Vision 84 was not only about the computer technology. Rather it was about information technology, which included—according to Svensson—the computer technology and space technology. In fact, he referred to the space activities more broadly: ‘The Norrbotten County is and will become an even greater playground for international research. Already today scientists gather; researchers from east and west at Esrange’s space station and KGI’.432

However, there were voices among the public suggesting that these changes were not for everyone. Kiruna had a lot of predominantly male mine workers who had no interest in these new computer and space technologies. A radio station made a point of this. One reporter had interviewed an old mine worker who had lost his job in the Svappavaara mine. According to this worker, this new development was not for him personally, but at the same time he thought it was good that the youth were given a chance.433 What this example shows is that the visions of a changing Kiruna might have been open for everyone in the Municipality, even though not everyone were cut out for it.

Figure 4.2 shows a view over the Vision 84 conference in Kiruna Town Hall. The picture shows the main hall with the stairs leading up to the upper floors. In the middle of the stairs a large Vision 84 sign displayed with five rockets. In the middle of the floor, pointing towards the stairs, there is also a model of a rocket (in red and white). Showcases and posters displayed information about the various space activities. These showcases and symbols played a central role in the conference and informed the visitors that space was part of the notion of the ‘new’ Kiruna. Because this took place in the town hall, the heart of Kiruna Municipality, it was an important part of the place-making process.

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433 Sveriges Radio (SR), Nyhetsmorgon Pi, see n. 430.
The conference included several presentations and seminars. For example, David Firnberg presented the Milton Keynes experiment and compared it to the development in Kiruna. The seminars were arranged on topics such as future visions and information technology.

SECOND CONFERENCE: SPACE IS BUSINESS

In preparation for the second Vision 84 conference there was another study tour to Milton Keynes on 5–9 November 1983, two months after the first conference. This time, Svensson and Essling, together with five other delegates,
would go. The specific purpose of the visit was ‘to study applications of information technology in Milton Keynes and investigate how to transfer and make use of this in the current development in Kiruna.’

The follow-up Vision 84 conference was held on 3–5 September 1984, in connection with the inauguration of the new Space House (see the section The Space House below). This second conference was perhaps even more than the first one a matter of promoting Kiruna as a computing and space town, and there was a stronger symbolic focus. Part of the marketing campaign was the presence of NASA astronaut Karol J. Bobko (b. 1937) and his wife. Thor Svensson motivated Bobko’s presence as follows:

All development projects such as this one need elements of marketing or advertising. In that sense, the presence of an astronaut has been of great importance. But above all, it also functions as a confirmation of the status of the current Swedish space activities as seen by Europe and the world. NASA has thus evaluated Kiruna’s space activities sufficiently interesting to be worth the attraction that follows from having an astronaut as a guest.

The second conference was focused on the following themes: 1) Landscape information and satellite technology; 2) Information management in

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435 Original quotation: ‘Att studera tillämpningar av informationsteknologi i Milton Keynes och söka överföra och pröva detta till vad som är under utveckling i Kiruna,’ KK-KP7, see n. 434.
3) Computer-aided construction and mining; and 4) Future Town Kiruna.\(^{438}\) Worth noting here is that the iron ore mining was part of the conference. As mentioned, the LKAB mine used advanced computer technology, and the idea appears to have been to develop this further.

Of particular relevance to the present study was the theme that concerned the two businesses that were housed in the new Space House—a company called Satellitbild AB, and the National Swedish Land Survey. Among the presentations were topics such as the use of satellite-based information for map production, the role of remote sensing in weather forecasting, satellite remote sensing and land-use interpretation, vegetation mapping, and geological surveying.\(^{439}\)

When Fredrik Engström (b. 1939), the CEO and President of Rymdbolaget, held a speech at the conference, he concluded: ‘Space is business. Today, space is becoming commercialised.’\(^{440}\) One of the regional newspapers used the phrase ‘Space is business’ as an eye catching and thought provoking headline.\(^{441}\)

In addition to the indoor events, there was a chance to participate in a day of outdoor adventures including rafting in the Torne River, gold panning, grouse hunting, and a visit to the top of Sweden’s highest mountain Kebnekaise. These wildlife and nature—not just during the conference’s excursion but in general—played an important role in marketing Kiruna and the surrounding region:

We now invest in the future. In these times, when miles and miles no longer make any difference, Kiruna’s place at the top of Europe has given us indisputable advantages at the threshold to the future. A future that is based on mining, space, information technology, and tourism. A combination of old and new, where the different parts in this endeavour are woven together and provide advantages far bigger than each separately. We base our visions on this


\(^{439}\) TS-Vision2, see n. 438.


\(^{441}\) NK-1984-09-05, see n. 440.
and dare to say future town Kiruna.\textsuperscript{442}

There are several interesting things to note in the quotation above. The first has to do with the spatial aspect where geographic distances do not matter, which is understood to be referring to the advantages in communication that come from the new information technologies such as Videotex and satellite communication. Another noteworthy aspect is that the future is visualised as being based on a combination of different sectors: mining, space, information technology, and tourism. Space activities (and those involving computers and tourism) do not replace but rather complement the mining industry. The quotation continues as follows:

We have learned that it is only through our own efforts that we can build and create a secure future. In Kiruna we welcome the future. We know that now all the advantages are on our side. The high-technology and commercial exploitation of space, the adaptation to a society based on information technology, the latest findings in mining technology, and the wilderness where the forest does not die but there is still fresh air and pure water. We have all this and much more in Kiruna. Therefore, we say: Welcome to Future Town Kiruna.\textsuperscript{443}

\textsuperscript{442}Original quotation: ‘Nu satsar vi framåt. I dessa tider, då mil och kilometer inte längre spelar någon roll, har Kirunas placering på Europas topp gett oss odiskutabla fördelar vid tröskeln till framtid. En framtid som grundar sig på gruva, rymd, data och turism. En kombination av gammalt och nytt, där de olika delarna i denna framtidssatsning vävs ihop och ger fördelar långt större än var för sig. Det är på detta vi grundar våra VISIONER och vågar säga FRAMTIDSSTAD KIRUNA’ (Full caps converted to emphases.), TS-Vision2, see n. 438: p. 12.

Apart from combining the old with the new, it is also a matter of combining nature with new technologies. So these aspects—the old and the new as well as nature and technology—were important in promoting Kiruna as a future town. This suggests a complex kind of embedded relationship between the different industries and the activities that were connected with science and technology. At the same time, there was a common goal—building a reliable future. However, it is striking how the Saami culture and their reindeer herding industry are absent in the quoted passage above. Whether this was intentional or an accidental oversight is difficult to tell, but it is nevertheless noteworthy.\footnote{Regarding how the view of the land as ‘pure wilderness’ can be used in making invisible the agency of the indigenous people, see e.g. Val Plumwood, ‘The concept of a cultural landscape: nature, culture and agency of the land’, in: \textit{Ethics \& the Environment}, 11.2 (2006), pp. 115–150: p. 120.}

The variety of the conference organisers is an indication of how different types of actors could meet in a forum such as the Vision 84 conference where they collaborated in moving towards this goal. The space industry was represented primarily through the company Satellitbild AB, but a number of information-technology companies were also involved, and even the mining industry was represented. While mining and space might appear to have nothing to do with each other, the idea behind this conference shows that the organisers believed there was a connection.

The first thorough marketing campaign of Future Town Kiruna (Framtidsstad Kiruna) took off in 1984. The concept ‘Future Town Kiruna’ was branded, at least informally, by associating it with a logotype that would be printed on letter-heads and brochures and would appear in various newspaper articles. Figure 4.3 shows the different logotypes that were considered. It is particularly interesting how many of these illustrations combine landscape features such as the iron ore mountains with space technology such as rockets or antennas.

The illustration that won most votes shows a large antenna in front of the iron ore mountain (Figure 4.4). Thus, this symbol captures two of the fundamental ideas that Kiruna is built on: mining and space, but also nature and technology, the old and the new—largely in accordance with the quoted passages above. Moreover, this is an example of how the public was involved
The proposed logotypes for the concept ‘Future Town Kiruna’ were presented in a temporary information paper together with a voting form. The headline read ‘Kiruna should have a new symbol—choose which one’. No actual voting results could be found, but a variant of logotype number 2 (first row, middle) became the official one. (See also Figure 4.4.) Source: *Framtidsstad Kiruna: en tidning om offensiv utveckling*, Kiruna, 1984 (Courtesy of Kiruna Kommun)
in the place-making process.

![Figure 4.4: The winning logotype for the Future Town Kiruna project, designed by Lars-Arne Ekerstig (b. 1943). It portrays the iron ore mountain behind a satellite antenna, as well as the slogan in a futuristic computer-inspired font. The font was slightly modified from the original version. (See also Figure 4.3.) Source: Framtidsstad Kiruna, klistermärke. Tidningsurklipp 1: 1983. Vision 84/86. Thor Svensson’s collection (henceforth cited as TS-Vision3) (Courtesy of Kiruna Kommun)](image-url)

VISION 86

On 26–27 September 1986, a follow-up conference called ‘Vision 86’ was organised by Thor Svensson on behalf of Kiruna Municipality.\(^{445}\) It was ‘aimed at managers and politicians who were in need of broad information about technology in the computing and space industries and who had an interest in community development processes’.\(^{446}\) In particular, the conference visitors would become familiar with the new opportunities in information provided


by the satellite technologies, such as remote sensing.  

The conference, themed ‘New information paths’, would provide an overview of the importance of the new tools that the emerging high technology would bring to different fields. Computer technology, satellite technology, remote sensing, electronic information transfer, and landscape information were examples of such tools. In addition, there were excursions to study the space research at the KGI, the rocket and satellite technologies at Esrange, remote sensing and landscape and community information at Satellitbild, and computer businesses in the Space House area.

As with the previous Vision 84 conferences, it is particularly interesting that the space activities were dealt with in a commercial way. The documents in the archive do not reveal much of the actual content, but the titles of the presentations reveal at least something. For example, one of the speakers was Arne Helger (b. 1934), the head of the Esrange rocket base, who held a talk on the idea of profitable space technology, and the head of Satellitbild AB Svante Astermo (b. 1938) talked about the useful products of remote sensing for forestry, environmental care, and mapping. The Director of the KGI, Bengt Hultqvist held a presentation about the steps from basic research to space industry. Part of his talk was quoted by a local newspaper:

There is no turning back, we must continue forward on the path of knowledge.
Without doubt, basic research provides man with a certain hope for the future.
We will acquire new knowledge that can conquer the problems of today and tomorrow. But it is utterly important that we will handle the knowledge in a responsible manner.

A speaker who brought up the important role of the space activities in

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breathing new life into the economy of Kiruna was the Under-Secretary of
the Department of Employment and Productivity, Ulf Westerberg (b. 1941),
who had also led the Ore Fields Commission.

Kiruna has to find a ‘new’ industry that is involved with completely different
things than the mining industry. A large company that dominates, such as the
L.KAB, will overshadow everything else. The space activity here is incredibly
important here. It breaks this mentality and inspires to something new in the
mining district, which is still rather fragile.\textsuperscript{450}

He also talked about the importance for the industrial climate to com-
plement the state-owned industries with private ownership.\textsuperscript{451} In this way,
the Government tried to instil a form of mentality that could make Kiruna
find a new way forward. As a representative of the Government, Westerberg
was in a powerful position to not only suggest but also to some extent even
govern the economic direction of Kiruna. The solution was to put stake in
the space industry, which he emphasized as important to Kiruna. In other
words, the space sector was something unique for this particular place. This
form of discourse contributed to the identity of Kiruna.\textsuperscript{452}

\textbf{The Space House}

The Space House was conceived in connection with the formation of the
satellite-imaging business Satellitbild AB (see next section). In March 1982,
the Kiruna municipal council approved the construction plans. At this stage,
the building was referred to as the Industrial House Kiruna (\textit{Industrihus
Kiruna}), and besides housing the newly formed Satellitbild AB it would house
three other companies: Control Data AB, the Swedish National Land Survey,
and Servicecentralen i Gällivare.\textsuperscript{453} Control Data AB was an international

\textsuperscript{450}Original quotation: ‘I Kirunamåste man hitta ett “nytt” näringsliv som sysslar med helt andra saker än gruvindustrin. Ett stort företag som dominerar, exempelvis L.KAB, lägger sin skugga över allt annat. Rymdverksamhet här är oerhört betydelsefull. Den bryter bruksment-
alityt. Det spirar något nytt i Malmfälten, som fortfarande är ganska skört,’ NK-1986-09-27, see n. 449.

\textsuperscript{451}NK-1986-09-27, see n. 449.


\textsuperscript{453}Kommunfullmäktige, Sammanträdesprotokoll, §66, Industrihus Kiruna,1982-03-31. 661-
(henceforth cited as KK-Allm32).
company involved in technical service of small and large computer systems as well as providing education and consulting services. The technological equipment used by all three companies was sensitive to external disturbances such as regular air traffic, high-voltage power lines, and heavy industries. In the site selection process, the building board of Kiruna discussed four alternative locations for the new building, all in central Kiruna. Of these four alternatives, they chose the Syrsan block with the motivation that disturbances would be the lowest in comparison to the other sites, while the building would be central enough to be close to residential homes and restaurants for the staff. Even though the geographical location was not as important here as it was for setting up the KGO or Esrange, it is evident that the site selection process mattered to some extent.

In a 1983 television interview with the journalist Anette Carlsson (b. 1945) (AC), Thor Svensson (TS) had explained the official name of the building, the Space House (Rymdhuset):

AC: Why is it called the Space House?
TS: Probably because it is the activity of Rymdbolaget together with Control Data that initiated the planning. And with Rymdbolaget, there were space activities – space house. Then it became colloquially known as the Space House.

AC: Is it a bit more stimulating to the imagination with space, the space corporation, and space activities, compared to information technology and computing?
TS: Yes, I think so. The space activity is exciting. It is, if you want to put it that way, spectacular. My encounter with the computer activities started through Rymdbolaget and Esrange.


Among other things, this dialogue is an example of how the act of naming is relevant to the making of a place. What matters most in this aspect is not so much what activities were meant to be placed in this Space House, but rather the fact that it was given that name, with a clear connection to the emerging space identity of Kiruna. Thus, the naming of the Space House was not only a symptom of this identity but also a contribution to it.456

The Space House was inaugurated on 5 September 1984 (Figure 4.5). Present at the ceremony was the Swedish Minister of Finance Kjell-Olof Feldt (b. 1931), who stated:

In these days Kiruna surprises Sweden by putting its name on the map as a place that invests in the future and even beyond the future. I want to congratulate Kiruna and its inhabitants on this new Space House, which is the first in Sweden and surely also the most northern in the world.457

Radio and newspapers made a point of ‘the Silver Ark’ (Silverarken)—the nickname that the Space House had been given by the public partly because of its silvery look, and partly as a reference to the so-called Silver Ark in the religious Korpela movement, which had been in existence in the region during the 1930s. The movement believed they would be saved by a silver ark sent by God.458

In a letter sent to those who would attend the inauguration of the Space House and the Vision 84 conference, at least the ‘Future Town Kiruna’ theme, Kiruna Municipality stated the following: ‘[The Space House] has become something of a symbol for the development in Kiruna into a computer centre

in the north.\textsuperscript{459} In other words, Kiruna Municipality officially promoted Kiruna as a town based on computer and information technologies. It appears that, at this stage, the different actors had slightly different ideas about the direction they imagined the town would take with regard to industry and the economy. These visions included different aspects, such as computer technologies, space technologies, and the more abstract idea of the future. I suggest it is fair to say that it was not so much a matter of which industry to put stakes in—the computer and space industries were already in place, or at least emerging—but rather a matter of finding the right way to promote it, and finding a suitable epithet.

\textbf{Towards a Remote-Sensing Centre}

In addition to the Landsat station established at Esrange, Rymdbolaget started to plan another ground station for interactive, computer-aided analysis of satellite images, also at Esrange. The German-Swedish engineer Stefan Zenker

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure4.5}
\caption{The first Space House in central Kiruna, 1985. ©Lantmäteriet (Courtesy of Lantmäteriet)}
\end{figure}

\textsuperscript{459} Original quotation: 'Det har blivit något av en symbol för utvecklingen av Kiruna till ett datacentrum i norr', KK-Allm28, see n. 436.
(b. 1940), who had been part of the Remote Sensing Committee, was one of the central figures involved in this development. He wrote or co-wrote several of the initial documents. In Rymbolaget’s application to the Norrbotten County Administration for funds, he explained how the need for this new station was a direct consequence of the existing station. By placing it at Esrange, the two stations would accomplish different tasks in the same process chain: the first station would receive images from satellites, while the second station would process those images. Not only would this new activity create job opportunities, it would also have positive consequences for research, technology, and rational community planning in Norrbotten County as well as nationally.

What is particularly noteworthy here is the motivation to establish the new processing station at Esrange because there was already an existing station situated there. This line of reasoning is familiar, not least in the site selection of the rocket base Esrange, where one important motivation was to establish it near the existing KGO. Once again, it was about expanding the space activity that had already taken root in Kiruna. This time, however, the KGI (formerly the KGO) was not part of the picture. This is verified in Zenker’s description of the new activity:

There will be a ‘vertical integration’ with the already existing satellite image receiver. Thereby, it is possible to efficiently use the technical ‘know-how’ which is available at Esrange. The activity can also contribute to stimulate the staff at Esrange who are already involved in the process of receiving satellite images. [...] Esrange is established as an internationally leading centre for advanced remote-sensing technology. Thereby, the satellite imaging activity which is already in place at Esrange is consolidated and expanded, and the risk for competition with foreign stations of similar kind is reduced.


Rymdbolaget’s Fredrik Engström later phrased it similarly in a radio interview, where he talked about a mutual give-and-take situation between Kiruna and the new remote sensing activity:

The activity at Rymdbolaget and its subsidiary is going through a powerful expansion. This expansion is primarily in the business area, above all in communications. We will control satellites from the ground in Kiruna. We will receive images from the satellites in Kiruna. Thereby we benefit from Kiruna’s nice location. In addition, we will place the processing activity […] also in Kiruna.\(^\text{662}\)

Engström was thoroughly interested in the business aspect of these activities. Whenever he appears in the material, he talks about the satellite imaging in terms of business and profit, in line with Daniel Bell’s notion of how information can be treated as economic goods.\(^\text{663}\)

In the early documents that describe the planned station, three types of processing were mentioned. The first was image manipulation and enhancement. By using a computer system and a colour television screen, an operator could view the satellite image on the screen and use the computer to change aspects such as contrast, colour scales, enlargement, and filtering. Such manipulation was primarily meant to aid interpretation and make it suitable for printing on film. The second type of image processing was called geometric corrections, which meant that satellite images taken over a period of time could be compared by being superimposed on a topographic map. The third image-processing method was known as thematic classification, which meant the computer classified each pixel (dot) of the image as one of several categories such as water, forest, or asphalt. Based on these classifications, it was then possible to produce map-like images.

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\(^\text{663}\)Benner & Widmalm, see n. 267: 18f.
There were many potential applications of these image-processing methods. Rymdbolaget considered applications in northern Sweden or northern Scandinavia as ‘perhaps’ most interesting, including forestry, solid-earth geology, inventory of wetlands, mapping of reindeer grazing, and other uses. However, they also saw potential uses for other geographical areas. The main idea was to establish a new business for processing and analysing satellite images in Norrbotten County.

It is important to stress here that Rymdbolaget itself was not about doing either basic or applied research. Their primary task was to do business, and they saw a potential in selling products for research and other uses; in other words, to facilitate for others to do research. Part of the business idea was to bring researchers to Kiruna:

The large number of important potential applications will lead to a steady stream of researchers and users to Kiruna and Esrange. This will give an economic and intellectual boost to the region. Kiruna will get a new branch with a strong character of research and development. The Municipality will thereby get some of the advantages that would be associated with having a university faculty or a university college.

As this quoted passage shows, the boundary between business and research is not sharp. This provokes questions regarding, for example, the so-called objectivity of scientific research. However, this is beyond the scope of the present study.

The new remote-sensing station was important to not only the space industry but also the computer industry. Fredrik Engström and Stefan Zenker wrote as follows in a document that describes the idea of the remote-sensing centre:

Of perhaps greater importance is that the remote sensing works as a kind of motor in exploiting the fast development of the computer technology to improve geographic information processing. The remote-sensing technology

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464 SSC-Centralarkiv, see n. 460: p. 6.
contributes to the development of a number of methods and equipment that allow for a transfer to computer-aided information processing far beyond the field of remote sensing.466

Because this was written in 1981, it is easy to understand how the computer technology had such a central role in the coming Vision 84 conferences. It was, of course, no coincidence. The plans to set up a local industry that were to a large extent dependent on computers was an important factor in making computer technology—in addition to and in connection with space technologies—part of the drive to differentiate the industry in Kiruna. Space and computer technologies were not simply two separate fields. Similarly, research, industry, technology, and even tourism were connected with each other: ‘a remote sensing centre can lead to […] Kiruna getting a more differentiated industry, the research and industry in the region receiving valuable influences, and Kiruna having a limited but steady flow of visitors.’467

**KIRUNA IN THE REGION AND THE WORLD**

Before closing this chapter, I will mention briefly three other concurrent aspects. Although they do not concern business ventures, they are significant to the emergence of Kiruna’s space activities and installations, and they are of particular relevance to the present study.

**THE VIKING CONQUERS SPACE**

The French **SPOT** satellite, which was mentioned earlier, was launched from the Kourou launch site in French Guiana on 22 February 1986. Piggybacking

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467 Original quotation: ‘kan ett fjärranlyscenter i Kiruna betyda att […] Kiruna får ett mera differentierat näringsliv, att forskningen och näringslivet i regionen får värdefulla impulser, och att en begränsad men jämn ström av besökare kommer till Kiruna’, SSC-Centralarkiv2, see n. 400: p. 7.
on the same rocket was Viking, the first Swedish satellite. This event was an enormous boost for the prestige of the Swedish space industry and research, and Kiruna’s position as an international space centre was strengthened by the ground stations that were situated there to communicate with the satellites. In addition to the ground stations that served both Viking and Spot, the European Space Agency had decided to establish a ground station close to Esrange to serve their planned polar satellites, such as the ERTS-1 satellite, which was planned for launch in 1989. The new ground station would be located in Salmijärvi, about seven kilometres from Esrange on the road to Kiruna.

These events—the successful launch and operation of the Viking satellite and the establishment of the new ground stations—further added to the idea of Kiruna as a space town. For example, a magazine referred to Kiruna as ‘Europe’s space centre’. Whether Kiruna rightly could be said to be ‘Europe’s space centre’ is of less relevance in the context of this study; the interesting aspect is that the idea was out in the open, regardless of whether it was strictly correct or not.

An example of how this enthusiasm spread can be found in a series of stamps released in 1984 by the Swedish General Directorate of Posts (Postverket), which considered the Viking satellite project of such symbolic importance that it issued two stamps, engraved by the artist Martin Mörck (b. 1955) based on illustrations by the artist Kurt Netzler (b. 1922), on 13 October 1984 (see Figure 4.6 and Figure 4.7).

The one stamp shows the Viking satellite hovering above earth, with...
Sweden in the centre of the northern hemisphere and the wavy northern lights in the background. The other stamp shows a collage of symbols from Esrange, the two large ‘golf ball’ antennas on the roof of the Esrange main building, one of the large radar antennas that can be seen in the area around Esrange, the Skylark launch tower, and in the background the northern lights.472

As is evident from these stamps, they are full of symbolic messages, all pointing in the same direction; by now, Sweden was a space nation, and Kiruna a space centre.

**The Scandinavian EISCAT Radar Network**

Another aspect that is relevant with regard to the space activities and material installations in Kiruna is the European Incoherent Scatter Scientific Association (EISCAT) project, that was designed to study the properties of the

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472This was far from the only time Kiruna had been on stamps. As the article shows, there have been many stamps picturing Kiruna in one way or another, including images of the landscape, the iron ore mine, and the town itself. In fact, as early as 1970, a stamp was issued that showed the launch of a rocket from Esrange. Gunnar Bendix. ‘Kirunaträkten: ett populärt frimärksmotiv’, in: *Kiruna: 100-årsboken*. D. 2, S. 475-479 : ill. (vissa i färg) (2000): p. 476.
ionosphere with a specific radar method that used a network of radar transmitters and receivers on the ground. The first steps towards this project were taken in the mid-1960s when Bengt Hultqvist and the Norwegian physicist Olav Holt (b. 1935) began to collaborate on a draft plan for the upcoming General Assembly of the International Union of Radio Science in Ottawa in August 1969. Hultqvist suggested to Holt that they seek a partner in Finland and consider setting up ‘tristatic’ radar facilities in Sweden, Norway, and Finland.\(^\text{473}\)

The method was based on so-called incoherent scatter, which means radio waves are sent from a transmitter, then bounced via the ionosphere and scattered down to the receiving stations. This method requires very specific conditions, and choosing a location for these facilities required scientific as well as other considerations, including ambient electrical interference, the nature of the terrain, accessibility, and electrical power supply. Ideally, the structures should be set up in a remote spot. However, this was difficult to achieve while also satisfying the requirement of easy access. This latter argument of combining a remote spot with easy access is much the same as one of the arguments used for the KGO and Esrange. Another requirement was specified as follows:

The local terrain should afford radio screening of the site from potential sources of interference, and particularly from coherent auroral reflections and propagation between the transmitter and the receiver stations via tropospheric scatter from mountain peaks, aircraft or other objects visible from both the transmitter and receiver antennae. A succession of gently rounded mountains between transmitter and receiver stations gives the best protection against diffracted and tropo-scatter signals. Such terrain is common in northern Scandinavia.\(^\text{474}\)


By comparing this with, for instance, the selection of the Esrange rocket field, it shows how, once more, the natural conditions of the surrounding landscape were important, but for entirely different reasons. Here it was not a matter of having a large uninhabited space to minimize risk of damages or injuries. Instead, it was a matter of minimizing the impact on the transmitted signals. Nevertheless, the relevant part is that it was to a large extent the landscape and geography that had an influence on the site selection.

Other relevant factors in selecting the location of the transmitter and receiver stations included the vicinity to the sounding rocket ranges at Esrange outside Kiruna and at Andöna near Tromsø. The apogee of the rockets launched from these two sites would result in a relatively short horizontal distance between the rockets and the EISCAT stations.475

A transmitter was placed in Tromsø in Norway and receivers in Sodankylä, Finland, and Kiruna, Sweden (see Figure 4.8).476 The headquarters and the operations centre were placed at the IRF (formerly the KGI) in Kiruna, with twelve full-time employees.477 A fourth station, the EISCAT Svalbard Radar was placed on Spitsbergen Island in the Norwegian Svalbard archipelago in the Arctic Ocean. In addition to these three countries, France, West Germany, and the United Kingdom were also involved in the project.

Looking specifically at the Kiruna antenna, it was placed about eight kilometres east of Kiruna and two kilometres north of the E10 road and the KGO. The large dish, which measured thirty-two metres in diameter and was elevated above the ground, was clearly visible from the road. Still today, it is one of the first space-related structures that a visitor to Kiruna might notice when arriving by road or in an aeroplane (see Figure 4.9). It is rather eye-catching with its outlandish, artificial metal construction that stands out in sharp contrast to the surrounding forest and mountains that are almost void of any other signs of humanity, and yet it is an instrument that helps humankind to better understand nature.478

475Ibid.: p. 12.
477The name change from KGI to IRF will be described in the next chapter.
478As an example of the problems that can arise when such high technology is placed in a cold winter landscape, see e.g. Tor Hagfors. The effect of ice on an antenna reflector, Eiscat technical note 3. Kiruna, 1978.
The EISCAT radar network became operational in 1981, and the event was celebrated with a simultaneous ceremony at the three sites in Kiruna, Tromsø and Sodankylä on 26 August.\textsuperscript{479} After the initial ceremonies in Tromsø, and

Sodankylä, the participants flew from there to Kiruna and joined in with the main celebrations that had already started there. Among the hundreds of guests invited to Kiruna were His Majesty Carl XVI Gustaf (b. 1946), King of Sweden, ambassadors representing the different member nations, politicians, and regional and local representatives. In addition, a number of people of central importance to the EISCAT were present, such as the director of the project, the radio astronomer Tor Hagfors (1930–2007) and the British physicist Granville Benyon (1914–1996), one of the founders of the EISCAT.480 News of the EISCAT inauguration spread to other countries. For example, the journal *New Scientist* reported on the event.481

![Figure 4.9: The EISCAT radar antenna in November 2000. Photo by the IRF. (Courtesy of the IRF)](image)

Kommuns Centralarkiv, Kiruna (henceforth cited as KK-Allm27).

480 Hultqvist, *Space, science and me*, see n. 57: p. 125.

Auroral Large Imaging System

In addition to the eiscat, another network that can be considered important to the idea of Kiruna as an agglomeration of different material installations is the Auroral Large Imaging System (ALIS) network of camera stations that were constructed in Kiruna Municipality and other parts of northern Scandinavia in the early 1990s.

The underlying idea is referred to as multi-station imaging, where the internal structure of transparent objects such as the aurora can be determined using stereoscopic triangulation. Although auroral height estimates date back to at least the 1720s, the use of triangulation for these purposes is considered to have started in the early 1910s when the Norwegian physicist Carl Størmer (1874–1957) used two cameras situated at two separate sites to triangulate the auroral arcs and thereby estimate their height. An important development in this technology was the ‘All-Sky’ Camera, which enabled close to a 180-degree field-of-view. During the IGY 1957–1958, a network of such ground-based all-sky cameras encompassed 114 stations around the polar region, including at least one at the KGO. Photographic methods not only meant improved optical images of the aurora. By employing triangulation techniques where cameras were situated at two or more locations, estimates of the auroral altitude became more accurate. Another way to understand the aurora was to study its spectral data.

In 1989, the space scientist the IRF in Kiruna Åke Steen (b. 1952) proposed ALIS to consist of a network of twenty-eight imaging stations around northern Scandinavia, where each station would be spaced 100 kilometres apart with a field-of-view of about ninety degrees, making it suitable for triangulation. Due to various budgeting problems, the envisioned twenty-eight node network could not be realised and had to be reduced to eight stations. These

first six were set up in a specific order to allow for the best coverage of the oval auroral zone: Kiruna, Merasjärvi, Silkkimuotka, Tjautjas, Abisko, and Nikkaluokta. In addition, two stations were planned at Kilvo and Nytorp, but these later changed in favour of a station in Frihetsli in Norway and eventually also one at the Ramsfjorden EISCAT site (see Figure 4.10). The construction work started in 1991, and by 1993 the first images were produced.\footnote{Brändström, see n. 482.}

The insulated camera houses measure $2 \times 2 \times 1.5$ metres with a dome-shaped window on top that protects the camera. During the summer months, when it is too bright to take photographs of the aurora, the ALIS cameras are out of operation and the domes are covered with a protective cap (see Figure 4.11). Small yellow signs on the outside of the building inform the visitors of the purpose of the station. One sign reads:

This station belongs to a ground based system, ALIS, for concurrent imaging (photography) of northern lights and high-altitude clouds. Images from up to 14 stations in the north of Sweden are analysed at a control centre in Kiruna. The research project is intended to use collected data from light-sensitive detectors to produce three-dimensional images of the measured object. Northern lights can be described as a window that enables us to see the result from plasma processes in the closest part of the universe. The station is alarmed and under continuous electronic surveillance.\footnote{Original quotation: ‘Stationen tillhör ett markbaserat system, ALIS, för samtidig avbildning (fotografering) av norrsken och höghöjdsmoln. Bilder från upp till 14 stationer i norra Sverige analyseras på ett kontrollcentrum i Kiruna. Forskningsprojektet avser att med måtdata från ljuskänsliga detektorer framställa tre-dimensionella bilder av måtobjektet. Norrsken kan liknas vid ett fönster som ger oss möjlighet att se resultatet från plasmaprocesser i den mest näraliggande delen av universum. Stationen är larmad och står under kontinuerlig elektronisk bevakning.’}

There are additional warning signs. One sign alerts ‘Danger of death: do not touch’, and another says ‘Warning: The machines can be started remotely without warning’.\footnote{Original quotations: ‘Livsfarlig anläggning: vidrör ej’ and ’Warning: Maskinerna startas från annan plats utan föregående varning.’}

From the analytical perspective of this study, the ALIS network was another important addition to placing the space activities in Kiruna on the map and in the physical environment. The ALIS map quite literally was an indication of this, and even though the map itself might not be familiar to many residents...
of and visitors to Kiruna, the small station huts have been observed by people who have been out skiing or riding snowmobiles, or hiking, camping, hunting, or fishing in these areas. Much like the EISCAT antenna that stands out in contrast to the surrounding trees, these stations are eye-catching technological installations placed close to nature. While they are not as conspicuous as the EISCAT antenna, the camera dome on the roof certainly must make people curious.

![Map of northern Sweden](image)

**Figure 4.10:** The Swedish nodes (red squares) of the ALIS network. One node is placed in Gällivare Municipality in the south. QGIS map by the author. ©Lantmäteriet [Licence 12014/00569]
As the map shows, the camera huts are spread over a relatively large area (notice the fifty kilometre distance measurement at the bottom), extending far away from the Esrange rocket field, the KGO, and the other space-related facilities. Thus, this dispersal of the ALIS buildings in the area contributes to the notion of a space region rather than a more concentrated town in the traditional sense of a population centre. The ALIS facilities together with the other space-related installations form a regional cluster where all space activities and structures are clumped together. Although they are rather sparsely situated, they constitute a unit that stands out in contrast to the larger northern Scandinavian region.
Conclusions

The different business ventures that were initiated in Kiruna in the first half of the 1980s were part of an ambition to breathe new life into the municipality after the severe period of the iron ore crisis. Among these new enterprises was one new business area in particular that stood out with regard to its focus on space technologies, the remote-sensing industry. The operational activities of new industry were established at Esrange, and the customer-oriented activities were set up at the new Space House in central Kiruna.

Kiruna was already known for its space research and rocket base operations, where the former was basic research, and the latter largely served this basic research. The science policy expert Michael Gibbons and his colleagues have referred to this notion of traditional basic research university establishments as Mode 1. Proponents of this form of knowledge production typically argue that it is independent of wider societal trends. In contrast, Gibbons suggested the Mode 2 model to represent the form of knowledge production that serves the needs of new societal contexts that reach outside traditional university settings. The analysis above shows how Rymdbolaget formed a subsidiary Satellitbild AB, whose business model was to produce and sell images based on data communicated via satellites and the ground station at Esrange. With the new remote-sensing industry, Kiruna had become a place for space business, where the knowledge production matched the Mode 2 concept. Enterprise based on space-oriented knowledge was becoming, or at least was visualised as, a promising new contribution to Kiruna’s economy. Similar to the notion of Mode 2, Kiruna can (in accordance with Daniel Bell) be seen as an example of a knowledge society, where information serves as a fundamental economic resource.488

Of central relevance to why Kiruna was chosen as the site for the operations of satellite ground stations were the organisational changes in 1972 and the plans by Rymdbolaget to expand the operations at Esrange. The rocket base had the necessary infrastructure to facilitate such ground stations. Another reason that it was specifically Kiruna rather than any other place

488 Benner & Widmalm, see n. 267: 18; Bell, see n. 369; Michael Gibbons. The new production of knowledge: the dynamics of science and research in contemporary societies, London: Sage, 1994: 2f,23.
in Sweden that was chosen for these new activities had to do with Kiruna’s geographical position close to the North Pole, which meant that the ground stations could have more frequent contact with polar satellites compared to ground stations closer to the equator.

These arguments can be related to those that were used when choosing Kiruna as the place for establishing the KGO and Esrange; the relatively unique geographical location and the need for infrastructure were common motivations. By pointing to already existing activities and material installations, if not in the case of the KGO, at least in the case of Esrange, and now also the remote-sensing activities, the related satellite stations, and the Space House, these decisions contributed to the making of Kiruna as a place intended for space activities. It is interesting to note how it was not only the functions—the activities themselves—that were expanded through the new space business ventures but also the physical place that changed with the new buildings and other structures required to support the new activities.

Added to this agglomeration of space activities and material installations were the EISCAT and the ALIS networks. Both complicate the notion of the space installations being concentrated to a few specific places inside the borders of Kiruna Municipality. In both cases, material structures such as radar antennas and camera houses were installed not only within the borders of Kiruna Municipality, but also outside its borders, in a wider geographical area that surrounds and includes Kiruna. This collection of scattered physical structures should be seen in contrast to the ideas of a ‘science town’ or ‘technopole’ or similar concepts of knowledge places where material structures tend to be placed in a more concentrated arrangement. That is to say, it is not necessarily a matter of the distances between the different structures, but rather that they are ‘clumped together’ in what can be regarded as the same place, whether it is in a small area, such as a village or town, or a larger area, such as an entire region. Thus, EISCAT and ALIS both add to the notion of Kiruna as a regional space cluster rather than a space town in the more traditional sense of a town as a population centre.489

Another conclusion from the above analysis is that the ambitions by

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489 In connection with this notion of a regional cluster, it is also interesting to compare with the network of research stations that were set up for the IGY in 1957–1958. To what extent can these be said to have formed a regional cluster?
Kiruna Municipality to boost its economy led to the first large-scale intentional place-making process, where Kiruna was promoted as a particular place. Although the phrase ‘space town’ was not explicitly used in the place promotion, the space activities were an essential part of the phrases used to promote Kiruna as a ‘future town’ and as a ‘computer town’. Here, it is essential to understand how these seemingly different areas were treated as rather integrated with one another so that computer and information technologies were seen as intimately connected with not only the space technologies but also the mining technologies, and together they were seen as a promising way forward into the future. Thus, to the different actors involved, it was not problematic to talk about a computer town and a space town interchangeably. What mattered was to promote Kiruna as a place for something other than the existing industries, above all something that could function as a complement to the mining industry. The place-making ambitions became of central importance in this politics. The notion of Kiruna as a space town became further established through the events surrounding the Viking satellite, which became a symbol not only for the national Swedish space activities in general, but also for Kiruna specifically.

In summary, this chapter has shown how business ventures were an integral part of the deliberate efforts to remake Kiruna into a computer town and space town. This place-making process contributed a great deal to the notion of Kiruna as a form of creative milieu, science city, or technopole.

Another element that is of relevance in the analytical framework of how such places of knowledge evolve is education, which is the focus of the following chapter.
CHAPTER 5

MAKING PLACE FOR EDUCATION: SPACE CAMPUS 1992–2000

The collapse of the Warsaw Pact and the end of the Cold War had a great impact on the formation of a united Europe in the early 1990s. The European Community (EC) expanded not only further east but also further north, and Sweden and Finland started negotiating for membership. These events affected developments in Kiruna in several ways.

First, the EC had a regional policy that aimed at supporting the economic well-being of certain regions. At first, there was only one priority category, Objective 1, for geographic areas whose development was lagging behind, and neither Sweden nor Finland qualified for this. The negotiations for Sweden’s and Finland’s EC membership, however, led to the introduction of a new priority category that suited large parts of both countries. This was Objective 6, and it was focused on extremely sparsely populated areas, which included Kiruna.\(^ {490}\)

Second, the end of the Warsaw Pact and the Cold War had implications for Kiruna and the space education in another way. During the Cold War, the Baltic Sea region, including Sweden, had been largely militarized. After the

\(^ {490}\) In Sweden, Objective 6 encompassed much of northern Sweden: parts of the Norrbotten (including Kiruna), Västerbotten, Jämtland, Västernorrland, Gävleborg, Kopparberg, and Värmland counties. Regeringens Proposition 1994/95:19.
collapse of the Warsaw Pact, the Swedish Armed Forces were reformed and 25 regiments were disbanded in the period 1990–2005, among them the I 22 Lapland Ranger Regiment based in Kiruna.\textsuperscript{491} Because a Swedish regiment typically had several hundred employees, these reforms struck hard in the economies of the relatively small municipalities, such as Kiruna, that were dependent on their military regiments.\textsuperscript{492} As a result, the Government acted to support the affected municipalities. For Kiruna, higher education in the field of space-related subjects was one solution to this situation.

Third, another international development that would have relevance for Kiruna was the 1992 UN World Summit conference in Rio de Janeiro, Brazil, which was a global effort to face environmental issues. These environmental ambitions would be implemented largely through the EC. For Kiruna, this meant new ambitions that affected higher education in space-related subjects.

This final empirical chapter will show how higher education in Kiruna emerged from the early 1990s until the inauguration of the Space Campus in 2000. The analysis will be rooted partly in the visions to develop higher education in the 1980s, and partly in the international events outlined above.\textsuperscript{493}

Education is a fundamental ingredient, together with research, in any innovation system that is based on cooperation between universities, industries and the government. In Science and Technology Studies, this organisational model is often referred to as the Triple Helix model.\textsuperscript{494} Another concept is the


\textsuperscript{492}Ibid.: p. 14.

\textsuperscript{493}Higher education in space-related subjects existed in Kiruna already from the opening of the KGO in 1957 in the form of postgraduate education, or perhaps more correctly, supervision. For example, during 1957–1962 the Austrian physicist Johannes Ortner (b. 1933) spent parts of his doctorate studies at the KGO. This period, however, is outside the scope of this chapter. Interview mit Johannes Ortner. Web page. 2011-07-23. URL: http://archives.eui.eu/en/files/transcript/15801.pdf (visited on 2015-04-01); Bruno Philipp Besser. Austria’s history in space, Noordwijk: European Space Agency, 2004: p. 57; Hultqvist, Space, science and me, see n. 57: p. 40.

\textsuperscript{494}Henry Etzkowitz & Loet Leydesdorff. ’The dynamics of innovation: from National Systems and “Mode 2” to a Triple Helix of university–industry–government relations’, in: Research policy, 29.2 (2000), pp. 109–123; For the use on Triple Helix in a Swedish context, see Sven Widmalm. ’Innovation and control: performative research policy in Sweden’, in: Transformations in research, higher education and the academic market : the breakdown of
notion of a ‘golden triangle’, which focuses on the links between research universities, military agencies, and high-technology industries. This chapter will examine these forms of cooperation in the context of Kiruna, with a focus on higher education.

Of central relevance to this chapter are the debates regarding the physical location of the various education initiatives. This debate would primarily concern whether the education would take place in central Kiruna or at the site where the KGI was located. Also of relevance to this dispute was the relationship between the education in Kiruna and the two major universities in Luleå and Umeå. Consequently, this analysis is yet another case of a place-making process.

Because the notion of universities and education is central to this chapter, it is important to know something about the wider context of universities in Sweden. Although there has never been a university in Kiruna, the higher education in Kiruna would involve, as suggested above, collaborations with the two regional universities in Umeå and Luleå. When UMU was inaugurated in 1965 in the mid-northern region of Sweden, it succeeded Uppsala University as the northernmost university. Further north, in the coastal town Luleå, higher education and research in technology started in the early 1970s. In 1977, this education became the Luleå University College (Luleå Tekniska Universitet) (LTH), and in 1997, it was designated university status as Luleå University of Technology (Luleå tekniska högskola) (LTU). As of this writing, the LTU is still the northernmost Swedish university and the one closest to Kiruna. While this might seem unproblematic, the relationship between the two main universities and Kiruna is rather complex and would have an impact on Kiruna as a unique place for space.496


496For example, consider the early connections between the KGO and UMU. In 1967, the Bengt Hultqvist was installed as the first professor in Geocosmophysics at UMU, and the KGO became an institution at UMU with regard to the postgraduate education, while its research function continued to be organised under the Academy until 1973 when it became an independent state-owned research institute. Moreover, while UMU preferred that Hultqvist moved to Umeå, Kiruna Municipality wanted him to remain in Kiruna. Hultqvist, Space, science and me, see
The chapter first describes the visions of higher education in the 1980s. This part will serve as a background to the main part of the chapter that focuses on the developments in the 1990s and ends with the inauguration of the Space Campus in 2000.

**In the Wake of the Iron Ore Mine Crisis**

**Kiruna Space University**

An influential person in the early idea of a so-called space university in Kiruna was the economic geographer Bengt Sahlberg. In a letter to his associates Victor Epstein and Thor Svensson in the autumn of 1983, while discussing how to develop the region, he shared his vision of what he referred to as the future university, or the International Space University. The idea was inspired by Sahlberg and Epstein’s visit to Milton Keynes earlier that year. Besides being a ‘new town’, Milton Keynes was known for hosting the world’s first-distance teaching university—the Open University—that had opened to its first students in 1971. This form of educational was largely based on distance teaching methods using computer technologies.\(^\text{497}\) Strictly speaking, however, this was not an academic university in the true sense, but rather an educational institution or perhaps a university college. It seems they initially used the term ‘university’ because they had hopes that it would form the basis of a future university. In Sahlberg’s words:\(^\text{498}\)


\(^\text{498}\) The naming of universities, university colleges, and institutes is a rather complex issue. Prior to the 1977 Swedish university reform, the higher education was divided into four sectors: universities, university colleges (*högskolor*), institutes, and vocational schools. There were certain criteria for an establishment to be named a university. One was that it must be run by the government, and another that there must be more than one faculty doing research and education. With the 1977 reform, all higher education was restructured where there four education sectors were unified into the concept of *högskolan*. However, the term ‘university’ continued to be used. Elzinga, ‘Universities, research and the transformation of the state in
The vision is a university where education, research, industry and management collaborate within the significant sphere that the space section already encompasses, but above all will encompass. The International Space University in Kiruna can become an engine in the northern Swedish and Nordic regions, as well as Sweden’s research and development in many important fields in the future.\textsuperscript{499}

Thus, Sahlberg imagined that this ‘university’ would boost not only local development but also regional and even national development. In a following letter to Svensson, Sahlberg had further developed his ideas about the university. Among other things, it would be constructed as an ‘electronic university’ with a considerable amount of distance teaching and with contacts to other Swedish and international universities.\textsuperscript{500} In an interview almost 30 years later, Sahlberg recalled that he had wanted to adapt the concept of distance teaching to the context of the space activities in Kiruna, hoping it would be the cure for the situation that had lasted since the mine crisis.\textsuperscript{501} Regarding the ‘electronic’ or computer and network-based education, one inspiration was found in the metallographer Stig Björklund (1930–2008) and his group at the Royal Institute of Technology in Stockholm who worked on computer-aided education.\textsuperscript{502}

Regarding the different areas of education and research, Sahlberg did not elaborate much on these but referred to the areas that were in the process of expanding and as such had a potential to develop further, such as space


\textsuperscript{501} Sahlberg, see n. 416.

\textsuperscript{502} ÖLA-Vitbok2, see n. 500.
technology, computer technology, and biotechnology. Because of Sweden’s favourable geographic location, in combination with the international space activities already established in the country, he argued that the space research field was of particular relevance.503

In the initial phase in August, it appears that not many people knew about the plans; the archived communications suggest that only Sahlberg, Svensson, Epstein, and Lars Essling were informed. Gradually, more people became informed, including representatives of the space research programme as well as Kiruna Municipality, and the Ministry of Education and Research.504 The first Vision 84 conference contributed a great deal to making the plans public, not least through the mass media. For example, in a series of articles on the conference, the regional newspapers provided the public with the basic ideas behind the plans.505

It was around this time that the different parties involved started referring to the ‘university’ in terms of an ‘institution’ or an ‘institute’.506 In addition, it was likely around this time that Sahlberg liaised with the architect Ulf Ranhagen (b. 1947) who designed a model of the ‘space university’. The designs are not dated nor do they have any detailed descriptions. Their

503 In the archive documents, some actors use the terms ‘space science,’ ‘space research, and ‘space technology’ synonymously. ÖLA-Vitbok2, see n. 500.
504 Brev från Thor Svensson till Kerstin Nibleus, Fredrik Engström, Arne Helger, Svante Astermo, Göran Hansson och Bengt Hultqvist, 1983-08-29. ‘Kiruna rymduniversitet’ Vitbok 920229. Turismvetenskap – professor Bengt W. Sahlbergs arkiv (SE/ÖLA/12025). Landsarkivet, Östersund (henceforth cited as ÖLA-Vitbok3); Sahlberg said in a recent interview that he found the local politicians and officials the most compliant of all involved. Regarding this comment, the local officials were obviously in favour of ideas that had a potential to boost the local development, especially in these times following the iron ore crisis. Sahlberg, see n. 416.
506 The traditional concept of a university was reserved primarily for those academic institutions that could fulfil a certain number of criteria such as offering education in at least four different faculties, and have the authority, given by the Government, to graduate doctorate students. As a result, the use of the word ‘university’ became less pronounced. Gunnar Johansson, Motion till Kiruna kommunfullmäktige: Utbildnings- och forskningsinstitut i rymdteknologi till Kiruna, 1983-10-03. ‘Kiruna rymduniversitet’ Vitbok 920229. Turismvetenskap – professor Bengt W. Sahlbergs arkiv (SE/ÖLA/12025). Landsarkivet, Östersund (henceforth cited as ÖLA-Vitbok4).
contents, however, reveal some underlying ideas (Figure 5.1 and Figure 5.2).^{507}

![Figure 5.1: Visualization of the exterior of the so-called Space University. The buildings are situated near the surrounding nature, and probably not intended to be very centrally located. In the middle are the three round antennas, and between them stands a model of a rocket. The sign above the entrance says Kiruna Space University (Kiruna Rymduniversitet). Source: U. Ranhagen och P. Lowden, VBB, idéskisser Kiruna Rymduniversitet, odat. 'Kiruna rymduniversitet' Vitbok 920229. Turismvetenskap – professor Bengt W. Sahlbergs arkiv (SE/ÖLA/12025). Landsarkivet, Östersund (henceforth cited as ÖLA-Vitbok5). (Courtesy of Ulf Ranhagen)](image)

Some re-occurring place-making ideas in the history of Kiruna’s space activities are visualised in the drawings. For example, the first illustration shows the contrast between the surrounding wild nature and the new space technology. The name of the university, Kiruna Space University, suggests that the university was going to represent Kiruna rather than the region or country. Although none of these illustrations reached the public, they still show the intention to promote an idea where Kiruna was a place for a space

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university despite the surrounding wilderness. Thus, this ambition contained an element of place-making.
National and regional preparations

Based on the archived documents, the Swedish Government was first informed of the development in August 1983 and again in October, following the first Vision 84 conference. As a result, the Ore Fields Commission was involved and invited to a meeting, to be held on 15 November in Luleå. Besides the Government being represented through the Ore Fields Commission, a number of local and regional bodies participated that represented bodies from different societal sectors, including the kgi, Rymdbolaget, Kiruna Municipality, and the LUTH.

Shortly after that Luleå meeting, Essling at Kiruna Municipality wrote the first official letter to the Ministry of Education as well as the Ore Fields Commission, to inform them about the plans for an ‘international institute for education and research in space technology’ to be placed in Kiruna. Following a description of the space activities in Kiruna, Essling wrote that an educated staff was an important prerequisite for the success of the national space activities. Although the technological university colleges were important in this respect, there was no ‘space university’ anywhere in the world. In addition to explaining how such a space university could ‘become an important link in the research in different areas such as space medicine, polar research, environment and resource management, climate research, oceanography, material research, peace research, etc’, he asked the Ministry and the Ore Fields Commission to support the project.

The Ore Fields Commission agreed to consider the plans for the space

\[\text{\textsuperscript{508}}\text{ÖLA-Vitbok}, \text{see n. 504}; \text{Thor Svensson, Projektbeskrivning Kiruna Rymduniversitet, }1984-01-11. \text{‘Kiruna rymduniversitet’ Vitbok 920229. Turismvetenskap – professor Bengt W. Sahlbergs arkiv (SE/ÖLA/12025). Landsarkivet, Östersund (henceforth cited as ÖLA-Vitbok).} \text{\textsuperscript{509}}\text{ÖLA-Vitbok7, see n. 508.}\]

\[\text{\textsuperscript{510}}\text{Original quotation: ‘internationellt utbildnings- och forskningsinstitut’. The institute was referred to both as an institute and as a ‘space university’, although the latter was put in scare quotes to signal that the phrase was of a more transitory nature. Brev från Lars Essling till Chefen för Utbildningsdepartementet och Malmöfjältsutredningen, }1983-11-24. \text{‘Kiruna rymduniversitet’ Vitbok 920229. Turismvetenskap – professor Bengt W. Sahlbergs arkiv (SE/ÖLA/12025). Landsarkivet, Östersund (henceforth cited as ÖLA-Vitbok).}\]

\[\text{\textsuperscript{511}}\text{Original quotation: ‘kan på sikt bli en viktig länk i forskningen inom olika områden såsom rymdmedicin, polarforskning, miljö- och resurshållning, klimatforskning, havsforskning, materialforskning, fredsforskning mm’, ÖLA-Vitbok6, see n. 510.}\]
At the end of March, the investigation was completed and reported to the Government. Among many aspects covered, there was a section on ventures in the computer and space sectors. As for the education and the plans for a space university, the investigation had considered the matter with the involved parties and found that they were interested in having higher education and research situated in Kiruna. As a result, the LUTH, the KGI, Rymdbolaget and Satellitbild AB had agreed to form a foundation with the purpose of establishing and operating education in space-related fields, including postgraduate education in space technology, supplementary training for those already employed, special courses, and a summer university.

The investigators also added:

The idea is to use, as much as possible, the resources of the existing institutions and businesses and additionally borrow teachers from other parts of the country. In the long-term perspective, it will be considered whether to conduct—within the framework of the foundation—some undergraduate education for engineers as a complement to Luleå University, i.e. the engineers will continue their studies in Kiruna after their basic education in Luleå.

It is clear from this quotation that the investigators did not imagine the education at the space university to be based entirely in Kiruna, but rather have some connection with the LUTH.

Moreover, the Ore Fields Commission recommended that the Government delegate to the Norrbotten County Administration, together with the LUTH, the KGI, Rymdbolaget, and Satellitbild, to investigate more closely how such education and research activities could be organised. During the summer and the autumn of 1984, the investigation was under review.

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513 Malmfältsutredningen, see n. 361: 128f.

514 Original quotation: 'Tanken är att så långt som möjligt utnyttja de befintliga institutionernas och företagens resurser och i övrigt låna in lärarresurser från andra delar av landet. I ett längre perspektiv får sedan övervägas möjligheterna att inom ramen för stiftelsens verksamhet bedriva viss grundutbildning för civilingenjörer som ett komplement till högskolan i Luleå, dvs. att civilingenjörerna fortsätter i Kiruna efter genomgången utbildning i Luleå', ibid.: p. 129.

515 Ibid.: p. 129.

analytical framework of place-making, it is noteworthy how this inclusion of Luleå complicated the idea of Kiruna as a space town, although the different actors did not talk about this explicitly in those terms.

In addition to the matter being investigated on a regional level by the Ore Fields Commission, it was also debated to some extent in the regional newspapers. Some people opposed the idea of having the space university placed in Kiruna. One notable example is Ove Stephansson (b. 1938), a professor of rock mechanics at the LUTH. In an editorial, he argued that experience had shown that universities in general tended to recruit most of their students in the surrounding region, and because Luleå had its university college with a direction in technology and natural sciences, there would not be a sufficient number of students for another university. While Kiruna had a good foundation for the applied space technology, he maintained that it was better to make the LUTH become the centre for undergraduate education, postgraduate education, and basic research in space technology. Here, he commented on one of Kiruna’s mottos ‘space is our place’ and suggested that Luleå’s motto ought to be ‘the place for space’.

In a reply to Stephansson’s article, the editorial staff of the newspaper argued that although it was possible to find a way to connect the two universities, they were convinced that Kiruna should be the centre for the space activities. One of their motivations was that the Social Democratic party was about to debate on the matter at the upcoming national party congress, which could lead to Parliamentary support.

At the national Social Democratic Congress in September 1984, Lars Essling pleaded for a faster investigation into the plans for a space university, and the Minister of Education Lena Hjelm-Wallén (b. 1943) approved.

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518 Since October 1982, the Swedish Government was a minority government led by the Social Democratic Party. This would last until October 1992 when the right-wing coalition gained power. NSD-1984-09-06c, see n. 517.

the next months, the matter was in the hands of the Government, which sent the report by the Ore Fields Commission for external review. This resulted in the upcoming Government bill on regional development to propose concrete measures to develop higher education in Kiruna, although it was not in terms of a proper ‘university’.

An important step forward towards the realization of space-oriented higher education in Kiruna was taken in February 1985 with Government Bill 1984/85:115, which, in addition to proposing goals for regional development more broadly, pointed out three geographical areas in different parts of Sweden that required earmarked grants. Among these was Norrbotten County, and the bill suggested a number of measures to encourage a positive development in these regions. Concerning Norrbotten County, the bill was based largely on the Ore Fields Commission that was mentioned in the *Making Place for Business* chapter. One proposed approach was to strengthen research and development in the Umeå University Region (Umeå Högskolorregion), which was one of Sweden’s seven university regions, by granting financial support for a university education in the space field in Kiruna. In connection with this, the Secretary of State Thage G. Peterson (b. 1933) wrote:

> The [Ore Fields] Commission suggests that the [Norrbotten] County Administration, together with Rymdbolaget, Satellitbild AB, the KGI and the University College in Luleå, draw up a proposal for a *foundation* with the purpose of establishing and conducting *higher education and research in the space field* in Kiruna. The activity should, according to the commission, at first be built up around the postgraduate education in space technology, remote sensing and image processing, and special courses in the aforementioned subjects, as well as a summer university and so-called Nobel symposia in the field of space research.

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521 In addition to Norrbotten, the Uddevalla region on the west coast suffered from the decision in 1984 to discontinue the dockyards, and the Bergslagen region north-west of the Mälaren Valley had experienced several years of business closures primarily in the mining and steel industries. Schön, *En modern svensk ekonomisk historia: tillväxt och omvandling under två sekel*, see n. 95: 491ff.

522 In 1977, Sweden was divided into six university regions, each with a major university and a number of university colleges. Umeå University Region was the name of the northernmost region.
The idea to organise the education using regional advisory groups in research and education as well as research foundations was inspired by earlier examples of smaller Swedish university colleges that had tried this concept with good results. Peterson was of the opinion that this organisation had contributed to a better contact network and more efficient information exchange and knowledge transfer. Moreover, in many of the earlier cases of such collaborative forms, there had been established technology centres that facilitated the transfer of new technologies to small and medium-sized businesses.

Peterson also suggested that the new education would be financed through the earmarked regional budget. He would consult with the cabinet minister Ingvar Carlsson (b. 1934) and the head of the Ministry of Education to propose to the government that the board for the Umeå University Region investigate and carry out higher education in space technology in Kiruna. Initially, this would consist of individual courses rather than a complete programme.

As a result of the Bill described above, the Swedish government approved in 1985 to grant the KGI 1,000,000 SEK annually over four years for the development of space research as well as education in space technology. Although this was good news for the realization of the space university, Sahlberg pointed out in a letter to Svensson that the government did not utilise the full potential of Kiruna. In particular, he was critical that the grant was earmarked for the development of the KGI alone without a clear focus on all aspects of the space university.

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523 Original quotation: ‘Utredningen föreslår att länsstyrelsen, tillsammans med Rymdbolaget, Satellitbild AB, KGI och högskolan i Luleå, arbetar fram ett förslag till en stiftelse med syfte att etablera och bedriva högre utbildning och forskning inom rymdområdet i Kiruna. Verksamheten bör enligt utredningen inledningsvis byggas upp kring forskarutbildning i rymdteknik, fjärranalys och bildbehandling, specialkurser i nämnda ämnen samt sommaruniversitet och s.k. nobelsymposier inom det rymdtekniska området.’ (Emphases in original), Regeringens Proposition 1984/85:115, see n. 516: 127f.
525 Ibid.: p. 128.
Regional and Local Implementations

On 13 June 1985, the Government delegated two tasks to the board for the Umeå University Region. The first task was ‘to investigate the prerequisites and forms for a higher education in the space technology field in Kiruna, and to carry out such an education’, and it aimed at supporting the continued development of the space activities in Kiruna.\(^{528}\) The investigation was headed by Bo Danielsson (b. 1929), of the Board for the Umeå University Region, together with representatives from Kiruna Municipality, the Swedish National Land Survey, and Satellitbild. Hans-Erik Östlund (1925–2013), head of the Board for the Umeå University Region was also involved in the process.\(^{529}\) This was going to be a one-year continuation course in engineering that would start in the autumn of 1986 with two special branches, space technology and remote sensing/image processing. The CTH in Gothenburg would be responsible for the program and would plan it. The reason for this was that in addition to Esrange and the KGI, there were a number of institutions and industries concentrated to the Gothenburg area, and the CTH was well suited for the planning task. Besides, the CTH had been involved in the setting up of the KGO in the 1940s.\(^{530}\)

Nevertheless, it is interesting here to note that the CTH, which was geo-


\(^{530}\) KK-Allm34, see n. 528: p. 3.
graphically very far from Kiruna, was involved in the local and regional education. Because the education was intended for the benefit of Kiruna, the Board was evidently careful to keep the education localised to Kiruna, even though much of the organisation and responsibility was done by the CTH. Therefore, the KG1 and staff from the local industry would do the actual teaching.

The second task was ‘to investigate the opportunities to establish certain higher education in the Malmfälten area’, which was aimed at people who were either already employed or unemployed. Several courses were suggested, including tourism, computer administration, computer technology, etc. as well as a supplementary course in space engineering. The space technology course was intended to extend a one-year space technology course that had been provided since 1984 as the fifth year of the technology programme at the upper secondary school in Kiruna and thereby turn it into a two-year course.

In order to organise and coordinate the higher education on a local level, Kiruna Municipality formed a foundation called Space and Technology center in Kiruna, or Spacetek (Kiruna Utvecklingscentrum) in February 1986.

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532 The students who applied to that fifth year course were already quite qualified, having studied four years at the upper secondary school, and the Board had doubts whether it was offer them such a restricted education. KK-Allm38, see n. 531.

531 The literal translation of ‘Kiruna utvecklingscentrum’ is ‘Kiruna Development Centre’ but for some reason, Kiruna Municipality decided to refer to it in English as the ‘Space and educational center in Kiruna’. Also, at first, the foundation was called SPACEK (after its English name), but this later changed to SPACETEK. Anteckningar vid sammanträde 1986.02.11, punkt 6. Diarie nr 1985.562: Högskoleutbildningar inom dataområdet vid komvux i Kiruna. 608 Högskola mm 1983–1985. Kiruna Kommun. Kiruna Kommuns Centralarkiv, Kiruna (henceforth cited as KK-Allm39); Projektbeskrivning SPACETEK. Diarie nr 1986.359:
The one-year space technology extension course for engineering students started in Kiruna on 1 September 1986. The governor for Norrbotten County Curt Boström (1926–2014) was present at the opening ceremony and he expressed his optimism: ‘I call it the space university on purpose. Today it may be wrong, but I am convinced that in due time we will end up with a situation where we have a space university here.’ Moreover, he stressed that the new space education was intended to attract students from the entire nation rather than just Kiruna. By placing the program in Kiruna rather than in Umeå, it was thereby possible to take advantage of both the technological facilities as well as the local expertise available there through the KGI, Esrange, and Satellitbild. A year later, the two-year space engineering program, held by umu in Kiruna, was initiated.

In 1987, the KGI was reorganised into IRF, in part to modernize the name of the institute and avoid being associated with geophysics, which most visitors and other uninformed individuals believed was connected with the mining

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activities.\textsuperscript{537}

This part of the chapter has provided a context and background for the second part of the chapter, which analyses how the education developed after the international events in the early 1990s.\textsuperscript{538}

**ENVIRONMENTAL CONCERNS**

**THE FAR NORTH OF THE EUROPEAN COMMUNITY**

In 1993, Bengt Hultqvist of the IRF suggested to the Government that an environmental research institute should be placed in Kiruna.\textsuperscript{539} The background to this decision is found in global ambitions to face environmental problems.

The UN Conference on Environment and Development (UNDEC) in 1992 addressed sustainable development and environmental issues, and this resulted in, among other things, a non-binding action plan called Agenda 21 that could be implemented at global, national, and local levels. Part of this document focused on the role and use of research to accomplish a more efficient monitoring of the environment. A number of such activities were suggested, and one concerned data collection using satellite technology.\textsuperscript{540}


\textsuperscript{538} What has not been mentioned so far are the concrete collaborations with the LUTH, which is due to fact that these courses have not been directly connected with space technologies. The early collaboration with Luleå still deserves a mention because of how it would develop into the 1990s. One example was the decentralised distance course in micro computer technology, started in 1984 with a few compulsory meetings in Kiruna. But there were also courses in other academic fields. See *Utbildningskatalog för Norra högskoleregionen, läsåret 1983–84.* Umeå, 1983.


At the time, Sweden was in the process of becoming an EC member. Within the EC, the research-oriented aspects of Agenda 21 were implemented through several areas, including research into the natural environment, environmental quality, and global change; environmental technologies; and space technology applied to earth observation and environmental research. The Swedish Government had already decided on a national approach to Agenda 21, and the potential EC membership with its Objective 6 support could become a cornerstone in the funding of this national strategy.\(^{541}\)

This led the Swedish Government to suggest that one of the research institutes of the EC would be placed in the north of Sweden, for example, an institute with either a regional, environmental, forestry, or climate focus. Kiruna Municipality saw an opportunity here. The Government encouraged Kiruna Municipality to become a candidate for hosting such an institute. As a result, the local officials in turn encouraged Hultqvist to suggest to the Government that a new environmental research institute would be set up in Kiruna.\(^{542}\)

Hultqvist’s letter referred to the plans of a so-called space physics centre with a research school, which had been submitted to the Ministry of Education just a few days before. This latter document, written by a number of Sweden’s largest institutions that were involved in space physics research and applications, concerned the plans for an affiliate campus to the International Space University.\(^{543}\) In his letter to the Ministry of Education, Hultqvist suggested the space physics centre could additionally be turned into an environmental research institute, which would have broader scope and goals than

\(^{541}\) Regeringens Proposition 1993/94:111.


the centre affiliated with the International Space University. A fundamental part of the proposed space physics centre was the need for more postgraduate students who could participate in the many research projects and carry out their own research.544

On 23 March 1994, the Ministry of Education decided to investigate the prerequisites for establishing an environmental research institute in Kiruna. The task was delegated to the biologist Arne Jernelöv (b. 1941) and the university director at the LUTH, Daniel Enquist (b. 1939), with additional help from Sam Ekstrand (b. 1961), a scientist in satellite based environmental monitoring, who worked out a review of the Geographic Information System (GIS) activities in Sweden. A month later, their investigation was completed and reported to the Ministry. They suggested investments in the following areas: an environment data centre; research on climate change; an environment cartography centre for the Barents Region; a research unit for atmospheric chemistry and biological experimental technology for space experiments; and research and development in GIS systems. Research and development was rather central, and not much was said regarding continuing education.545

When the Ministry of Education sent the investigation to a handful of bodies for an initial review, only a few of them had anything to say about education. For example, Stockholm University concluded that a prerequisite for a successful effort was that the research and ‘of course’ the postgraduate education were both major parts of the activities at the established institutions.546 It was important not to ignore the education in these discussions. The Royal Swedish Academy of Sciences pointed out that it was ‘important that education and research at the proposed institute is done in close collaboration with the involved university region’ and that the education would be broadened by complementing the natural science and technology with elements of biology and ecology.547

544KK-MRI2, see n. 539; KK-MRI5, see n. 543: p. 3.
545KK-MRI3, see n. 540.
547Original quotation: ‘viktigt att undervisning och forskning vid det föreslagna institutet
In the autumn of 1994, the Ministry of Education officially announced the plans to establish a ‘European’ environmental and space research institute in Kiruna. Through the institute, which was supposed to be of the ‘utmost European class’, Kiruna would play a ‘prominent role’ in providing to the world the satellite data that were required for long-term environmental monitoring. This was not just of regional or even national relevance, but was an initiative of European and global concern. Kiruna could contribute to the international efforts to live up to the Agenda 21 goals. Similarly, it was not just a matter of tackling the environmental issues but also a matter of telling the EC that Kiruna and Sweden could contribute with something unique. This was still during the phase before Sweden had joined the EC.

Moreover, the institute would consist of a synergy between three main units: an environment data center for environmental data based on satellite images; a research and development unit for geographic information analysis; and a research unit for climate changes in the polar zones. The institute would boost research and development resources in the sectors in which Kiruna already demonstrated successful and unique geographical and institutional prerequisites.

The mass media reported on this plan, not the least regionally because it was supposed to lead to many new jobs in Kiruna. Above all, there were large headlines in the newspaper once it became clear that the Swedish Government was applying for EU Objective 6 funds for the institute. The institute was described as the first in the world. The Municipality commissioner Lars...
Törnman (b. 1951) told a regional newspaper that the application by the Government was ‘the biggest thing that has happened to Kiruna since Mangi found Kiruna’s iron ore’, referring to Amund Amundsson Mangi (fl. 1730s), a Saami who in 1736 reported to the authorities about finding iron ore deposits in the Kiirunavaara mountain.551

Among the more noteworthy aspects of this is how the environmental studies were becoming more institutionalized and more integrated with the space sector. Another interesting thing to note is Kiruna’s role not only regionally but also as a key actor in the international community; the idea was that a new institute in Kiruna would constitute an essential role in the global ambition to work for a better, more environment-friendly world. Once again, it is relevant to keep in mind that unlike the typical traditional space activities that were about reaching upwards into space, the satellite technology enabled scientists and researchers to turn the gaze back towards the earth, with a bird’s-eye view from above. Although this change of perspective was far from limited to Kiruna, Kiruna nevertheless played a central role in this new way of appreciating the earth. At the same time, it was never about abandoning the ground-based space activities in Kiruna. Even though the rocket and satellite technologies enabled for scientists to reach deeper into space, the instruments and measurements that were done on the ground remained a fundamental part, if not the most fundamental part, of these activities. Part of the success was to combine traditional ground-based stations with the satellite technologies.552

As should be clear from the above analysis, research and development rather than education were central in the early discussions of the new institute. Education became gradually more pronounced when the debates started to focus more on the academic and social environment, or the academic milieu to use another word (in part, to avoid confusion with the other meaning of the word ‘environment’). It is, however, important to see this development not as a sudden or distinct change but rather as a continuation of the earlier

551 Original quotation: ‘Det här är det största som hänt Kiruna sedan Mangi fann kirunamalm-en’ NK-1994-05-29, see n. 550; Regarding the formalities to fund the institute through the EU Objective 6, see Sveriges Riksdag Kommittéberättelse 1994:A12.
552 See also e.g. Hultqvist, Space, science and me, see n. 57: p. 107; Bengt Hultqvist. Interview. 2011-08-08.
debate.

ACADEMIC MILIEU—CHAOS OR COHESION?

Åke Steen at the IRF proposed early in May 1995, on behalf of the IRF, three different ways to organize the academic environment, with regard to research and higher education. The first alternative was to use two separate environments, one in the current academic environment of the IRF and a new one in the Space House. The second alternative was to have a single environment placed by the Space House, which would mean that the IRF would have to be relocated there. (Notice that at this stage he did not say anything about whether the other parts of Kiruna’s space activities would have to be relocated.) The third option was to expand the existing site at the IRF (see Figure 2.8 for a 1972 map of the area). Of these three, he (and the IRF) considered the first to be the least feasible, followed by the second and the third. Regarding the third, he referred to the long academic tradition of the IRF: ‘Alternative three is based on the historical connection between the Abisko Natural Research Station and the IRF.’

Steen also sent to Östen Bucht (b. 1940), the Planning Director at Kiruna Municipality, a newspaper article where the professor of economic and social geography Gunnar Thörnqvist (b. 1933) had been interviewed about how some degree of disorder is an important prerequisite for a creative environment. Thörnqvist based his idea on observations of different environments such as Silicon Valley and the Swedish Ideon research park in Lund. Steen added a comment saying that a typical Swedish organisation might be counterproductive. Thus, Steen and others obviously knew about international approaches to similar academic environments, much like Kiruna Municipality.


554 Thörnqvists idea appears in an article in the journal Ny Teknik. I have not explicitly searched for it, although a copy is included in the archive material. Jan C Aschan, Oreda grogrund för kreativitet, fax ur Ny Teknik. odat. Vol. I. MRI (Miljö- och Rymdforskningsinstitutet). Kiruna Kommuns Centralarkiv, Kiruna (henceforth cited as KK-MRI10).
had been in the mid-1980s.

The LUTH recommended, largely based on the request by students, to locate all education in one single place, preferably as centrally as possible in Kiruna. The Space House was the more suitable place for this, not least because of the existing GIS businesses already housed there. Other activities such as research and production could also be relocated to the Space House.\(^{555}\) The Swedish National Land Survey, which had its office in the Space House, also considered it a good idea to place all activities there because it would facilitate collaboration between the different research and production environments.\(^{556}\)

Jan Englund (b. 1941), the Head of Esrange, preferred Steen’s third option—to expand the facilities at the IRF. Englund argued against having several small academic environments, and instead advocated for the idea of having a single large area.\(^{557}\) Bengt Hultqvist at the IRF was also in favour of the third alternative, and he argued that the distance from the IRF to central Kiruna was not that much greater than the distance from the campus areas in Luleå and Umeå to their respective town centres. He also pointed out that the area where the IRF was situated had a lot of space for new expansions.\(^{558}\)

Arne Jernelöv, one of the two main investigators of the new institute, was in favour of the concept of an ‘academic environment’; he argued for a more closely integrated location, where working places, restaurants, recreational facilities, and meeting rooms would increase the chances of spontaneous meetings. The ideal solution, he reasoned, would have been to construct such an environment from scratch by establishing a cohesive campus. However,


because of the history of the different space-related activities that were spread around the Municipality, the more pragmatic way forward would be to extend the existing activities rather than rebuilding everything from scratch at a single geographic location.\footnote{Original quotation: ‘akademisk miljö’, Arne Jernelöv, Forskningsrådsnämnden, IMR och frågan om akademisk miljö i Kiruna, 1995-05-15. Vol. I. MRI (Miljö- och Rymdforskningsinstitutet). Kiruna Kommuns Centralarkiv, Kiruna (henceforth cited as KK-MRI15).}

One way of interpreting this notion of having the different buildings, installations, and activities drawn together more closely is that it concerns dedicating a specific are of Kiruna to space activities. This would likely mean that other buildings and functions would have to be relocated to allow for the new space that would be required. Thus, this can be seen as an example of how place-making quite literally involves making place for something—in this case making place for space-related activities and structures.\footnote{KK-MRI15, see n. 559.}

On 16 June 1995, many of the involved bodies met at the Kiruna town hall to discuss the matter more closely. Judging from the notes from this meeting, the different bodies had different interests, and, consequently, they emphasised slightly different aspects of the future academic environment. For example, while some found it important to talk about research, others found it relevant to include business and industry, or education. The consensus seems to have been to initiate collaborations and meetings between the different parties that would make up this new environment. In conclusion, they agreed that the most important matter—which Jernelöv and Enquist were working on—concerned the organisation of the new institute. Another prioritized question was the location of the research and education in Kiruna; a matter they found very important.\footnote{Christina Jurén, Institutet för Rymdfysik, Minnesanteckningar från möte på Stadshuset i Kiruna den 16 juni 1995 kl 0900-1200 angående den framtida akademiska miljön i Kiruna. Vol. I. MRI (Miljö- och Rymdforskningsinstitutet). Kiruna Kommuns Centralarkiv, Kiruna (henceforth cited as KK-MRI16).}

On 13 March 1996, the Ministry of Education set up the Environment and Space Research Institute (Miljö- och Rymdforskningsinstitutet), but because of delays in funding it would not be inaugurated until 21 October.\footnote{Svensk författningssamling 1996:173; Årsredovisning 1996. Institutet för Rymdfysik. 1997.}

To sum up the debate so far, it is evident that there were many opinions
regarding what the academic and social environment should be like in the future, and one of the core questions was whether to have the different installations and activities in the same place or if they should remain spread out in different locations.

**Politics in motion**

By the mid-1990s, Kiruna was often referred to as a space centre not only in Sweden but also in international contexts. This image was often produced by the media, but also officially, for example, by the Kiruna Municipality. However, this form of place promotion was also done on a national level. In 1994, the Swedish government appointed a commission to overhaul the national space activities more thoroughly. The reason for this broad review of the space activities was manifold. One argument was that the European, and thereby Swedish, space activities had for a long time been driven by the ‘Space Race’ between the United States and the former Soviet Union. What this new geopolitical situation meant for Swedish space activities required an analysis. In addition, earlier studies had indicated that there was a need to review the goals and directions of future space activities in Sweden. There was increasing competition from international actors, and Kiruna played a central role in this respect. When the investigatory report was published on 1 September 1995, the conclusion with reference to Kiruna started as follows:

Kiruna has increasingly been given a profile as the space town of Sweden, which has a positive effect also outside the space activities. The information technology is expanded, the level of education is raised, recruitment is facilitated, tourism is favoured by this space profile, etc. Space encourages the [Kiruna] Municipality’s economy and gives hope for the future.

Of particular relevance in this quoted passage is how the idea of Kiruna as not just any space town, but the Swedish space town, was apparently rooted

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among the representatives of the Swedish Government. From a place-making perspective, this was a clear example of how the space town concept was also promoted nationally.

The conclusion of the investigation above continued with a recommendation that it was urgent to safeguard the activities against competition from other developing space centres around the world, for example, the ones in Tromsø and Sodankylä. It was important to continue supporting the development of the space activities in Sweden. However, this development should also lead to the goals of expanding knowledge and user utility.

While the investigation was underway, the politics of higher education took a new turn after the Parliamentary election in 1994 when the new Government introduced an ambitious reform programme. The government proposition 1996/97:5 on 'Research and society' set the framework for the research policy for the coming period 1997—1999. Among other things, the government suggested that the small and medium-sized university colleges would be allocated permanent and increased funds.

In the tradition of the Swedish policy process, a number of motions were issued in response to this proposition. Of particular relevance to the context of the present study was a motion titled 'International space university college in Kiruna,' which explicitly referred to Kiruna's geographic location. It was issued by the member of Parliament Hans Hjortzberg-Nordlund (1928–2010), who was from Gällivare, not far from Kiruna. In reference to the recent governmental investigation into Swedish space activities, which had been published in 1995, he argued as follows:

The large spread of [space] activities around all of Sweden is not favourable for the space activities as a state-of-the-art research area. For this reason, the space activities should be concentrated, and the natural place for this is in Kiruna where much of the practical operations take place. Sweden should take the leading position in Europe by establishing an international university

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569 SOU 1995:78, see n. 564.
college with courses and research in everything that concerns space activities, e.g. astronomy, astrophysics, telecommunications, and satellite technology.\textsuperscript{570}

Thus, he believed in the idea of locating the different activities in the same place, which suggests that the space town should be further expanded with additional activities in close proximity to one another. Moreover, in this quoted passage, Kiruna was promoted as a place for space not only in a Swedish context but also on a European level; this is a clear example of place-making on at least two geographical scales. The example is in accordance with the theoretical framework of technopoles, science cities and other forms of knowledge places that are distinguished for their spatial density. Although Hjortzberg-Nordlund did not explicitly mention any buildings or other physical structures, he referred to ‘activities’ that, if they were relocated to Kiruna, were likely to require additional housing to that which was already in place. Although the motion was rejected by the Parliament, it shows how on a national political level there were ideas about how the space activities should be relocated to Kiruna and that Kiruna was a space town. The university college was at the heart of this as an expression of a broader political agenda that encompassed the economy of the region.

The new Master of Engineering program was started in 1997 at the LTU (formerly the LUTH), with the final year of the program being held in Kiruna.\textsuperscript{571} However, because of the small number of applicants to this program, the entrance requirements were lowered making it possible for more or less any applying student to be accepted.\textsuperscript{572} The education was affected by this change, and the interest for the program soon dropped below what was sustainable. One reason for the low interest was that students who had their families and friends in Luleå found it hard to spend the last year of their education in Kiruna, some 340 km away. On top of that, Kiruna Municipality was not

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\textsuperscript{572}Hultqvist, see n. 552.
\end{flushright}
always able to provide the students with accommodation. Even so, Kiruna was thought to be the best place for the final year of the program because some aspects of the program could not be accomplished with the resources available in Luleå. This dilemma was a problem for the IRF. In the end, the program was changed so that the part dealing with environmental studies was relocated to Umeå and the space education relocated to Luleå, and since then the attitude has been that as much as possible of the space education should be held in Luleå, although some things by necessity must be held in Kiruna.573

The GIS engineering programme, which had started in Kiruna in 1994, was one of three programs that did not manage to recruit its full quota of students. In order to continue providing these programs, which were seen as important to the economy of the region, the LTU had to improve recruitment. Most of the students were recruited regionally from the two northernmost counties of Sweden, Norrbotten and Västerbotten.574

In 1998, the LTU reviewed its education activities in Kiruna.575 This review led to the Vice-Chancellor’s decision to relocate the GIS programme to the IRF facilities by the start of the autumn semester in 2000 and to work out how a collaboration between Umeå and Luleå could be developed under the name Space University College in Kiruna.576 The Technical Faculty Board was commissioned to investigate these matters, and it delegated the task to a working group who published its report in November 1999.577

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573 Hultqvist, see n. 552.
575 Besides having courses in Kiruna, the LTU offered education in other cities in the region as well, such as Skellefteå, Piteå and Jokkmokk, although in other academic fields.
The Space Campus investigation

The plans of a space university college took a new turn in late 1999 after the Government’s decision to close down Kiruna’s I 22 military regiment. After the Cold War had ended about a decade earlier, a new geopolitical situation reduced the need for a Swedish defence strategy, and the Government decided to gradually disband 25 regiments around the country over the next 15 years. In November 1999, the decision was made to close down I 22, and about 200 people would lose their jobs.578

To compensate the affected municipalities for the loss of their regiments, the Government presented on 18 November 1999 a development program with support in areas such as employment, education, and new businesses. These measures would be financed through the structural EU funds. For the next operational period, 2000–2006, the EU Objective areas were restructured and Kiruna Municipality became part of the Objective 1 area. The total cost for the program in this area was estimated at 1,850 million euros, of which the EU would grant 722 million euros and the rest would be financed through Swedish authorities, municipalities, regional authorities, and private industry. Among the measures planned specifically for Kiruna was the establishment of a space university college.579

On 16 December 1999, a month after the Government presented its compensation for the closed regiments, the Ministry of Education summoned a commission to investigate how a space university college in Kiruna could be organized and realized and how it could become connected with the existing space-related activities in Kiruna. Among other things, the investigation would recommend overall goals and forms of operations; goals of education and research; the type of education that could be provided; organisation and structure; economy and financing; and a time plan.580 The Head of the Ministry of Education, Thomas Östros (b. 1965), appointed the physicists Bengt E. Y. Svensson (b. 1935) and Ulla Myhrman (b. 1941) to lead the investigation.581

581 Avd 3:1, Regeringskansliet, Utbildningsdepartementet, Utdrag protokoll §12, 2000-01-
What follows below is an analysis of the work done by this commission until they presented their report, titled ‘Campus Kiruna’, on 30 June 2000.\textsuperscript{582}

A prerequisite was that the IRF would form the basis of the new university college. Because the research and education in space and environment at the IRF and the other institutions in Kiruna already had connections with the LTU and UMU, the investigation would also consider how these collaborations could be maintained and how other potential collaboration partners could be included. Consequently, over the next half year, Svensson and Myhrman held meetings with several parties, including but not limited to, the IRF, the Environment and Space Research Institute, UMU, the LTU, local and regional authorities, the space technology company Saab Ericsson Space AB, and the Swedish National Space Board.\textsuperscript{583}

Among the most important of the matters that were debated during the investigation was the organisation of the planned university college because it concerned to what extent and under what forms the different parties involved—above all the IRF, UMU, and the LTU—would collaborate. In particular, the delicate matter of whether the IRF would maintain an independent institute or become reorganised into something else turned out to cause some conflict.

Already at the first meeting with representatives of the IRF on 14 January 2000, the investigators were told that there was no need to change the successful organisation of the IRF as an independent institute. There was a national responsibility to preserve the research at the IRF.\textsuperscript{584} At another meeting in

\textsuperscript{582} SOU 2000:73. \textit{Campus Kiruna: slutbeträffande.}

\textsuperscript{583} The archival documents from these meetings are somewhat difficult to interpret because they are largely written as notes where it is not always clear who said what. Diarium. Vol: 2000–2001. Utredningen om en rymdhögskola i Kiruna (SE/RA/325095). Riksarkivet, Stockholm (henceforth cited as RA-Campus).

February, the Chair of the IRF Board, Björn Molin (b. 1932), explained that although he was positive to having the education at the IRF extended, he was worried about the idea of organising the university college as a branch of other universities, by which he implicitly meant UMU or the LTU. Above all, he stressed that the research must not be at risk, and in connection with this he referred to three other national Swedish institutes—Onsala Space Observatory, Max Laboratory and Kristineberg Marine Research Station—that were all connected with a host university or academy.585

Leading representatives of UMU were of a different opinion, at least regarding the organisational form. At a meeting with the commission on 24 January, the Vice-Chancellor Inge-Bert Täljedal (b. 1942) stressed that UMU’s role in space physics was somewhat neglected. Space physics was, he argued, not unique to Kiruna because UMU was also doing research and providing education in that field: ‘The experience in Umeå is that there are forces at the Ministry [of Education] and in Kiruna that prefer an independent university college. People are irritated that the efforts by Umeå in the region are so little appreciated.’586

At the first meeting with representatives of the LTU on 10 February, they were, according to the notes from the meeting, not clear on the exact form of the organisation, but they preferred to maintain the connection between the IRF, UMU, and the LTU. The relation to the IRF was one of the major problems that had to be resolved.587


Thus, it was apparent that there were discrepancies regarding the fate of the IRF’s organisational form. In a letter to the investigators, signed on 18 April 2000, representatives of the four main bodies involved—the IRF, the LTU, UMU, and the Environment and Space Research Institute—recommended an organisation in the form of a consortium between the LTU, UMU, and the IRF. This consortium would benefit regional development, they argued. For example, collaboration rather than competition would benefit the recruitment of students and make it possible to offer education of high quality.\textsuperscript{588}

Two weeks later, Bengt Hultqvist expressed his opinion to the board of the IRF that the main purpose of the IRF, which was to do basic research in space physics in the form of an institute, would be at risk if the institute’s organisational form were changed. His main argument was that the most important and expensive projects, such as the advanced satellite experiments that the IRF was involved in, required a focus of resources that the independent institute was able to provide, while a university organisation was a lot less reliable in that respect. Here, Hultqvist related how satellite experiments were carried out abroad in countries like France, Germany, the United Kingdom, Russia, and the United States, where prioritized projects of that kind were the responsibility of research institutes rather than universities. Above all, he was critical of the early years of the higher education that the universities in northern Sweden had been involved with in Kiruna. During this time, he argued, the IRF had suffered many economical and organisational blows in order to get the new education programs started. Consequently, he stressed that ‘unless advanced research can be maintained in Kiruna, there are no real motivations to place the education there’. The primary task of the IRF was to do research.\textsuperscript{589}

Shortly after Hultqvist’s appeal to the board of the IRF, the Director of the


IRF, Rickard Lundin (b. 1944), sent to the commission an additional letter complementing the one he and his three colleagues at UMU, the LTU, and the Environment and Space Research Institute had sent in April. This time, he stressed—in line with Hultqvist’s concerns—that the new university college must not infringe on the successful research. He still maintained, however, that the proposed solution of a consortium would not only preserve but also strengthen future space research in Kiruna.590

Another reoccurring matter in the debates about the new university college besides the organisational form regarded the physical location of the university college. On the one hand, as mentioned, the facilities of the IRF had been used for a long time for educational purposes, and at the time of the university college investigation a new teaching building was under construction at the IRF.591 This was why UMU and the LTU preferred to keep the education housed at the IRF’s premises.592 However, when the GIS education was discussed by the LTU in one of the early documents, a number of arguments were given as to why the GIS education could also be undertaken at the facilities of the Space House in central Kiruna. One of these motivations was the benefit of having the education near industries, by which they implicitly meant the GIS-related satellite imaging and computer businesses. Despite these motivations, the LTU still argued for having the education at the IRF.593

On the other hand, several others were in favour of having the education take place in central Kiruna instead, either at the Parkskolan school in the heart of the town centre or at the facilities of the recently closed military regiment on the edge of the town centre but still very central compared to the IRF. For example, representatives of the IRF were in favour of using facilities in the town centre. Harald Eriksson (b. 1947), one of the board members of the IRF and a municipality commissioner, suggested that the education could


591 Årsredovisning 1997, see n. 574: pp. 2,27.


593 RA-Campus1, see n. 576.
be divided so that space and GIS was housed at the facilities of the IRF and the rest of the education at Parkskolan.\textsuperscript{594} During one of the meetings with the commission, a number of student representatives had the opportunity to voice their opinion of the planned university college. On the matter of the location of the education, they felt that the present location on the premises of the IRF was of some inconvenience because of the few bus connections to the town centre. The facilities at the old regiment were better suited for a university college. The teachers were also in favour of providing the education more centrally.\textsuperscript{595}

Several factors were involved in these debates regarding the different sites, and one of them concerned the official development plans for central Kiruna. During the spring of 2000, Kiruna Municipality had worked out a visionary document describing what Kiruna could be like in 2006. Among the many ideas that were envisioned was the notion of having the space university college strategically placed at Parkskolan in central Kiruna, although not much more was said on the topic in this visionary document.\textsuperscript{596} It is, however, clear that the matter of the site selection process for the university college was a rather complex process that involved many groups of actors mostly on the local and regional level.

In their final report to the Ministry, the investigators provided two alternatives with regard to the physical location of the higher education and research. The recommended option was to locate both the education and the research to a Campus Kiruna centrally in the town of Kiruna. An alternative was to locate the education in central Kiruna, while the facilities of the IRF would be dedicated entirely for research purposes.\textsuperscript{597}

In addition to the matters regarding the organisational form and the physical location of the university college, a number of other aspects were


\textsuperscript{595}RA-Campus7, see n. 585.


\textsuperscript{597}SOU 2000:73, see n. 582: 51f.
discussed, although these were not as problematic, at least judging from the
documents. Worth mentioning is the question of recruiting teachers, and
above all students. The fact that Kiruna was geographically relatively isolated
was seen as an obstacle in this respect because students had to be recruited
not only locally from Kiruna but also from faraway places such as the larger
cities of Luleå and Umeå or even further south.598

Regarding the direction of the education, the investigators Svensson and
Myhrman suggested that it was possible to use the existing research compet-
ence and the ‘unique external prerequisites’ in Kiruna to offer master’s-level
educations on top of the existing undergraduate programs in space and environ-
mental studies.599 This form of master’s education was likely to boost the
recruitment not only nationally but also internationally. Another direction
that the investigators advocated was courses related to the needs of the local
and regional community, such as teacher education, healthcare, business
economy, law studies, and language and culture. These broader courses were
also likely to improve the recruitment. They also recommended continuing
with the distance teaching.600

Responses to the Space Campus investigation

The ‘Campus Kiruna’ commission report, which was presented by Svensson
and Myhrman to the Ministry of Education on 30 June 2000, was sent to 19
bodies for review.601 On 7 September, the Ministry presented to the Parliament
a summary of the commission’s report as well as an assessment of the reviews.
All consulting bodies were in favour of establishing a space university college,
and all of those who had commented on the idea of a research school approved
of it. However, there were differing opinions regarding the organisation and
location of the university college.

598 RA-Campus8, see n. 586; RA-Campus9, see n. 587; SOU 2000:73, see n. 582: 31f.
600 Ibid.: 33f.
601 Regeringskansliet, Utbildningsdepartementet, Remiss av Utredning om en rymdhögskola
bildning, forskning 600, 661, 662, 663. Kiruna Kommun. Kiruna Kommuns Centralarkiv,
Kiruna (henceforth cited as KK-Allm14).
Kiruna Municipality stressed the relevance if maintaining the IRF as an independent institute and recommended that the education be organized as a Campus Kiruna branch with UMU and the LTU as the main universities. Regarding the location of the new university college, the Municipality was in favour of having it in the town centre. This was in line with the idea of establishing a science centre or science park centrally so that facilities, equipment, technology, and, to some extent, staff could be shared with the university college.\textsuperscript{602}

Hultqvist, who took the initiative to write to the Ministry in person, strongly argued against the commission’s recommendation to change the current organisational form of the IRF as an independent institute. By and large, he used the same arguments as he did in his letter to the board of the IRF a few months before, only somewhat more developed. Instead of the organisation recommended by the commission, he was in favour of the solution of a consortium that the involved parties had favoured.\textsuperscript{603}

Another interesting aspect about Hultqvist’s argument is how he considered the concept of an independent institute to be relevant on another level: “The independence and freedom in combination with the total dependency on domestic efforts have been important to the psychological climate and the entrepreneurial spirit in Kiruna.” The notions referred to here—the psychological climate and the entrepreneurial spirit—constitute an integral part of the identity of Kiruna as a space town. Rather than being controlled by central authorities in Stockholm or by the two northern universities in Umeå.


\textsuperscript{604} Original quotation: ‘Självständigheten och friheten i förening med det totala beroendet av egna insatser har inte varit minst viktiga för det psykologiska klimatern[sic!] och entreprenörsandand i Kiruna’ KK-Allm16, see n. 603.
and Luleå, the ‘success’ of Kiruna was largely connected with its independence and self-reliance. In a broader perspective, this attitude among the people involved in the space activities is in line with the more general ‘consensus’ among many northern Swedish people to reject much of the dependency on Stockholm. Put differently, proponents of the space activities in Kiruna preferred to see Kiruna as a centre rather than a periphery.

To sum up, while some consultation bodies, such as the IRF, Kiruna Municipality, and UMU, advised on a consortium between the IRF, UMU, and the LTU, there was also the conflicting notion, encouraged above all by Luleå, to make the university college a branch of the LTU. Among other solutions that were proposed was that of Uppsala University and Lund University who recommended that the branches of the IRF in Umeå, Lund, and Uppsala become part of the corresponding universities.

Based on the commission report and the following consultation responses, the Ministry of Education argued that the IRF was of such importance to the space activities in Kiruna that the Ministry was not prepared to support the commission’s recommendation regarding the reorganisation of the IRF. It was important that the IRF maintained its status as an independent body. The Ministry advised an organisation in the form of a collaboration group named Kiruna Space and Environmental Campus (Kiruna Rymd- och Miljöcampus), which more commonly became known as the Space Campus, and commissioned the LTU, UMU, and the IRF to form such a group, where each of the three bodies would have two members represented while the Chair member would be appointed by the Government. The group would cooperate to recommend an organisation for the activities at the the Space Campus.

Regarding the education, the Ministry advised that the IRF should contribute to the planning, course development, and teaching at both the undergraduate and postgraduate levels. The IRF would form the basis for the continued expansion of the education related to space and the environment. Moreover, the Environment and Space Research Institute, which had been in operation since 1996, was going to be decommissioned in accordance with

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605 Regeringens Proposition 2000/01:3: p. 171.
607 This new responsibility was also formalized in the Government’s instruction for the IRF. Svensk författningssamling 1996:645.
the original plan. Its atmospheric research program was going to be taken over by the IRF, and the rest of the activities were going to be transferred to UMU.\footnote{Regeringens Proposition 2000/01:3, see n. 605: p. 172.}

The Ministry recommended that the research school in space technology should be stationed at the LTU and that it should be expanded to include electronics and other technological fields of relevance to research in space technology. Moreover, the LTU should collaborate with UMU and the IRF—within the framework of the collaboration group for the Kiruna Space and Environment Campus—to develop the forms and contents of the research school.\footnote{Ibid.: 173f.}

As for the physical location of the university college, the Ministry rejected the commission’s recommendation to relocate the education to central Kiruna: ‘Although there are good reasons to locate all activities in Kiruna’s space and environment activities to the same place in central Kiruna, an efficient use of available resources requires that the expansion [of the IRF], which has already been built outside Kiruna, will be used in the future.’\footnote{Original quotation: ‘Det finns visserligen goda skäl att samlokalisera all verksamhet inom Kirunas rymd- och miljöverksamhet till Kiruna tätort, men ett effektivt utnyttjande av tillgängliga resurser förutsätter att den utbyggnad som redan skett utanför Kiruna utnyttjas även i fortsättningen’, ibid.: p. 173.}

THE ACADEMY IN THE WILDERNESS

On 14 September 2000, the new Space Campus—officially called the Space and Environmental Campus—was inaugurated in Kiruna (Figure 5.3). The King of Sweden, His Majesty Carl XVI Gustaf and Thomas Östros were present at the event. In his speech, His Majesty brought up, among other things, the collaboration between the three main parties involved: the IRF, UMU, and the LTU. Östros talked mostly about the new postgraduate education that had been proposed by the Government and was under external review at the time of the ceremony.\footnote{Anneli Lundmark. ‘Kungen på hedersplats vid invigning’, in: Norrbottens-Kuriren, (2000-09-15) (henceforth cited as NK-2000-09-15); Linda Grape. ‘En stor dag för Kiruna’, in: Norrländska Socialdemokraten, (2000-09-15) (henceforth cited as NSD-2000-09-15); TT.}
The inauguration was a celebration of both the new organizational form and the newly constructed building that extended the existing facilities at the IRF. The facilities, which dated back to 1948, had been rebuilt and extended several times through the years, and this most recent extension included a completely new annex for the education, as well as an extension where researchers, teachers, and students shared common functions like a library, a restaurant, and an assembly hall (Figure 5.4).

In the case of Kiruna’s Space and Environmental Campus, research had long been rooted there mostly because research was the main task of the IRF. However, as the above analysis has shown, education had also been taking place in the same facilities for a long time. One of the major changes from before was the conceptual transformation from treating the facilities as primarily an institute into also formally considering them as a university college campus, with not only research but also education. Even though education was not a new phenomenon, it had become more institutionalised, not the least with the new name of the campus. This is another example of
how a place is intricately interwoven with temporal processes; what began as a geophysical observatory had become something much more complex.

Moreover, the architect who had designed the new extension noted that the idea was to create a connection with the place with its magnificent natural surroundings. The ambition was to use natural shapes that would be deeply anchored in the terrain and encourage movement in contrast to rest so that the building mirrored the activity on the inside with researchers and students in their constant search for new knowledge.\textsuperscript{612}

The Space Campus was situated eight kilometres east of the town of Kiruna, just south of the E10 Europa road, but still relatively isolated (Figure 2.5). Local buses to and from central Kiruna were not very frequent, only a few per day. Apart from the restaurant and the library at the campus, there were no other restaurants, cafés, shops, or additional services within walking distance, which meant that students, teachers, researchers, and other staff and visitors came to reside more closely to each other. But the building's proximity to the surrounding nature was important. Unlike many other university campuses, the grounds around Kiruna Space Campus did not consist of large lawns or artificial parks. Instead, it was close to the ‘real’ nature with the boreal forest literally just outside the windows. The place encouraged inspiration among the students and staff, which is exactly what the British-Swedish physicist Sheila Kirkwood (b. 1953) had in mind at the inauguration of the space campus: ‘In Kiruna, a person is small and the atmosphere very large. The new house has been fitted with large windows so that students can, between lectures, take the opportunity to study the sky.’\textsuperscript{613}

Apart from the traffic from the E10 road, about 150 m away but obscured by a small hill covered with trees, the area around the campus was relatively quiet and free from artificial man-made noise and disturbances, which was also one of the reasons why the location had been selected in the first place in 1948. With nature so close, many of the students and researchers enjoyed


\textsuperscript{613} Original quotation: ‘I Kiruna är människan liten och atmosfären väldigt stor. Det nya huset är försett med stora fönster så mellan föreläsningarna kan studenterna ta tillfälle i akt och studera himlen,’ NSD-2000-09-15, see n. 611; For a similar comment, see NK-2000-09-15, see n. 611.
spending their free time outside the building. One example is the physicist Ingrid Sandahl (1949–2011), a passionate bird watcher who had set up many birdhouses in the area around the IRF.614

Another example is the doctorate student Johan Arvelius (b. 1973) who sometimes travelled to and from work on skis, following a trail that started at the sports centre in central Kiruna and reached the Space Campus about eight kilometres to the east (see Figure 5.5). In the far east of the map, the Space Campus is labelled KRM for its formal name Kiruna Space and Environmental Campus (Kiruna Rymd- och Miljöcampus).615 The ski trail is marked in red, starting at Matojärvi sports centre in the far west of the map, where the town’s ‘official’ ski trails were situated (marked in blue with dots). Notice the snowmobile trail (in dashed blue) to the EISCAT station in the north east. This map is a striking example of how Kiruna’s space activities are situated simultaneously in the ‘wild’ nature and in the near proximity of the central town. The campus is within, if not walking distance, at least skiing distance to residential premises as well as shops, restaurants, and other services (notice the church in the middle of the map, marked with a cross). The Space Campus even had its own annual cross-country skiing competition ‘IRF-runt’ (Around the IRF), a five kilometre trail around the campus that some employees used also during their lunch breaks.616 This represents a meeting between space technology and a traditional culture of skiing that, I argue, captures some of Kiruna’s identity.


The original motivation to place the KGO several kilometres outside the town of Kiruna had to do with a range of factors such as the observatory needing to be in the auroral zone and in a location relatively free from surrounding electromagnetic disturbances, while also being close enough to a population centre with services and other infrastructure. As this chapter has shown, the outcome of the planning of the new educational institute was that it, too, would be placed at the same facilities as the IRF. This ambition to keep the new campus site close to the surrounding ‘wilderness’ can also be partly found in the (originally North American) campus tradition and its idea of having academic university buildings in close proximity to each other while at the same time being placed in suburban or rural areas, often close to green areas like gardens, parks, or forests.  

617 The historian of science and ideas Sverker Sörlin once shared his view of why it is that many intellectual

environments of this kind have such an intimate relationship with nature:618

Of course [it is] because trees and green meadows accentuate the beauty of the buildings and bestow the institution with age and dignity. But perhaps also, on a deeper symbolic level, because the garden is a space in between, neither nature nor society, neither chaos nor order. The garden is an agent of opposites, a metaphor both for the discipline without which science will become feral, and for the wild state without which it will wither away.619

This duality that Sörlin talks about is also evident in the new space campus, not least through the surrounding geography, including both the natural landscape on the ground and the space above.

CONCLUSIONS

The first part of this chapter showed how, in the early 1980s, the ambitions by Kiruna Municipality to breathe new life into its economy after the iron ore crisis led to the idea to establish a so-called space university, or rather an academic institute, in Kiruna. Besides its focus on space-related fields, this institute would largely be based on distance education. Once the Government became convinced that the idea had potential, this led to the formation of the first undergraduate space programs in the second half of the 1980s, even if it was on a much smaller scale than the original plan. Although the original vision of a ‘space university’ had included plans for a new physical building, no such building had yet been realised.

The second half of the chapter analysed how the plans and realisations of a space institute, which would include higher education, continued to evolve into the 1990s. Two major parallel international developments—the Swedish membership in the EU and the UN World Summit conference in Rio—

618 See also e.g. Thomas Bender. 'Introduction', in: The university and the city: from medieval origins to the present, ed. by Thomas Bender. New York: Oxford Univ. Press, 1988: p. 3.
contributed to the education being expanded to include environmental studies. A third international development—the ending of the Cold War—turned out to have a large impact on the realisation of the institute. Throughout the 1990s, there were debates concerning, above all, the organisation and geographic location of the new institute. Finally, in 2000, the new Kiruna Space Campus was inaugurated at the old, although transformed, facilities of the former KGO buildings.

With regard to the broader aim and analytical framework of the study, a few things are of particular relevance here. To begin with, the analysis showed how there developed a form of collaboration but also conflicts between, above all, the KGO/KGI/IRF and the two large universities Umeå and the LTU. However, compared to earlier research that has shown how a major university in the near vicinity might be required for the development of a knowledge centre, Umeå in Umeå and the LTU in Luleå were at a considerable distance away from Kiruna.\(^{620}\) These regional relationships complicate the notion of the space *town*, and it could be argued that the space activities form a larger regional cluster that extends across not only municipal borders but also county borders. In any case, it is evident that the space activities could be closely connected with the other population centres in the north of Sweden. As a result, these tensions between the main bodies involved also affected the place-making ambitions. This became obvious in the discourses on the development of the education, where the relevance of the town of Kiruna itself was not as pronounced as in the earlier chapters; instead, it was the relevance of the region and even nation that became more relevant. In this context, the developments might be seen as a form of regional or even national place-making.

While the regional and national aspects were important, it is still interesting to note that the many structures and buildings in Kiruna that related to the space activities were at times at the very centre of the debates. Questions regarding the spatial proximity of these structures and the activities connected with them matters a great deal. Some argued that it was worth trying to move everything to the same place, while others maintained it was

\(^{620}\) Leslie, see n. 495: p. 2; For an example of how a knowledge place, much like Kiruna, can emerge without a large a university in the vicinity, see Bassi, see n. 8.
better to keep the different functions separated. These developments clearly
demonstrate how place matters and that the relationship between the town
and a university or an institute is highly relevant.  

Another noteworthy aspect in the debates over the local placement of
the education concerns the former facilities of the military regiment. This
building was considered by some to be well suited for the space-oriented
education. This can be seen as another form of place-making in the sense that
the former military activities were potentially going to be used for a different
purpose.  

Last of all, in accordance with the ambition to contribute to the broader
and more contextualised space history, this chapter introduced a type of activ-
ity that was not included in the earlier empirical chapters. As such, the chapter
contributes to forming a more coherent narrative of the different aspects of
Kiruna’s space activities. The four empirical chapters thereby complement
each other; not only with regard to the temporal dimension but also with
regard to the different functions and activities they cover.

The following chapter begins with a brief epilogue about yet another of
the space activities in Kiruna—space tourism—and then concludes with an
overall discussion.

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621 See also e.g. Bender, see n. 618: 29ff.
CHAPTER 6

CONCLUDING DISCUSSION

EPILOGUE: MAKING PLACE FOR TOURISM

Kiruna and its surroundings have long been a popular tourist destination, perhaps most of all because of the sublime nature, with the ‘wilderness’, the mountains, the national parks, and the rather extreme change from one season to the next.⁶²³ Among the most appreciated tourist attractions are the midnight sun and the northern lights, although these phenomena are not strictly speaking unique to Kiruna. What has made Kiruna stand out is the access to these natural phenomena in combination with other functions and attractions, for example, the Saami culture, the iron ore mine, the wooden church, and more recently the ICEHOTEL, which is the world’s oldest hotel constructed out of ice blocks.⁶²⁴

Since at least 1956, tourism in Kiruna has intermittently been investigated

and organised by the Municipality. Ideas to include aspects of the space activities and material installations date back to at least the mid-1980s when the plans for a Visitor Center took form. Judging from the archival sources, however, it appears that it was the CEO and President of Rymdbolaget, Fredrik Engström, who first raised the idea of such a Visitor Center at a meeting at Esrange as early as 1978. This was followed by a number of efforts to develop the plans, although these never resulted in anything concrete.

In the mid-1980s, the consultant Thor Svensson continued to develop these plans. He envisioned that it would provide information about different aspects of Kiruna as a ‘future town’, including the mine, space activities, computer technologies, and tourism. It would not only function as a tourist attraction, but would also provide a ‘supporting function’ to the Swedish space activities. Among the specific activities and objects that would relate to space tourism were permanent exhibitions with models and descriptions; guided tours of Esrange in ‘space cars’; souvenirs such as satellite models, rocket models, and actual rocket parts; and live broadcasts of rocket launches.

These plans were made during the same time as Kiruna was making an effort to turn the iron ore crisis around, and these plans should be seen in the context of promoting Kiruna as a future town, with the computer and information technologies as well as the space activities. Tourism was yet another potential way out of the crisis. It was also around this time that the transnational road between Kiruna and Narvik in Norway was completed, which, among other things, meant new opportunities for tourism.

Another effort


628 KK-Allm8, see n. 627: p. 1.

was the promotion of Kiruna as a ‘Winter Town’ in 1988. The general idea behind this concept was to turn the winter and with its associated activities into a product to be used in promoting Kiruna.630

Although the Visitor Center was never realised, the ideas associated with it have been brought up now and again in connection with discussions regarding the tourism more generally. Sometimes the mass media wrote about the plans.631 The most recent major attempt to breathe new life into these plans took form at the turn of the millennium following a motion submitted in 1999 by the local politicians Lars Törnman and Sten Nyhlén (b. 1965) to Kiruna Municipality. They argued there was ‘a lack of a common place in the centre [of Kiruna town] where visitors would be able to experience Kiruna as, among other things, a mining and space town’.632 Törnman and Nyhlén were inspired by the concept of the Cosmonova Theatre at the Museum of Natural History in Stockholm. They suggested that a large building should be built in the park known as Järnvägsparken so that visitors ‘even during summer could experience the northern lights with stars and the special darkness that we have here above the Polar Circle’.633

Because of these motions, Kiruna Municipality once again wanted to investigate the Visitor Center. The intention was to make visible and describe ‘a number of exciting things that are difficult for the inhabitants as well as visitors to see and experience [in Kiruna], such as a rocket launch, reindeer

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633 Original quotation: ‘även under sommartid kunde uppleva norrsken med stjärnor och det speciella mörker som vi har här uppe ovan polcirkeln’, KK-Allm11, see n. 632.
herding, or the northern lights, even though these are reoccurring phenomena in the municipality. The Municipality formed a working group consisting of representatives of the Municipality itself as well as the IRF, Esrange, and the Environment and Space Research Institute. This group suggested that a governing group be put together consisting of politicians, administrators, entrepreneurs, and other collaborators.

This time, the plans proceeded further than previous attempts, and the Municipality published a proposal specifying the form and contents of the Visitor Center, its architecture, where it would be built, and an estimate of the costs to build it. The underlying idea was to display ‘that which is characteristic of Kiruna’ and to provide a place where the visitors could ‘actively take part in science and new technology’. Moreover, the concept detailed what kind of science was seen as typical for Kiruna:

In addition, the visitors will be able to take part in what is characteristic of Kiruna’s research, namely how several disciplines in space and environmental sciences merge together and how the mapping of different causal connections presumes that different models become connections, all the way from the processes on the sun down to the plant life on the ground. It is thus a matter of a presentation, a visualisation of the concept, promoted by the researchers in Kiruna, known as eco-pelare [eco-pillar] that stretches from the earthly experimental environment to the source of all life—the sun. It is about exposing interdisciplinary space and environmental research in a global network.


Original quotation: ‘Därtill ska besökarna kunna ta del av det som kännetecknar kirun-
This idea sums up quite well the scientific aspect of the space activities; it was not only just about space science but also about environmental sciences and how they could be integrated and packaged as part of the space town concept. Moreover, the Visitor Center concept was also going to include the mining sector, the Saami culture, the settler history, and more. A particularly noteworthy idea was to use what they referred to as external authentic environments. These would be connected with the central facilities, so that, for example, the nature and environment section of the Visitor Center would be linked to the Abisko Natural Scientific Station and Tarfala research station, while the space research section would be linked to the activities at Esrange and the IRF:

In that way, the central physical facilities function as a gathering point that channels study visits and research tourism to the authentic environments. This means the Visitor Center will not only be a physical building in central Kiruna, but will also include excursions and environments for experiences outside the town center.⁶³⁸

What this quotation shows is how the different material installations and activities that were scattered around the Municipality would be tied together with the Visitor Center as a hub. Thus, an important aspect of this form of tourism was to have the tourists travel between the different sites, which in Kiruna’s case could mean an hour or two by car or bus, depending on the starting point and destination.

Another aspect of the plans behind the Visitor Center is of particular relevance here. One document suggested a number of ideas for exhibit stations

aforsknings nämligen hur flera discipliner inom rymd- och miljöforskningen flyter ihop och att kartläggning av olika orsakssammanhang förutsätter att olika modeller kopplas samman, ända från processerna på solen ned till växtligheten på marken. Det är således fråga om en presentation, en visualisering av det av kirunaforskarna lanserade begreppet ECO-PELARE som sträcker sig från den jordiska experimentella miljön till källan för allt liv – solen. Det handlar om exponering av tvärvetenskaplig rymd- och miljöforskning i ett globalt nätverk, KK-Allmio, see n. 636.

⁶³⁸Original quotation: ‘På det sättet fungerar den centrala fysiska anläggningen som en uppfångande besöksdel som kanaliserar studiebesök och forskningsturism vidare till de autentiska miljöerna. Det här innebär att Visitor Centret inte ska enbart vara en fysisk anläggning i Kiruna C utan också innefatta utflykts- och upplevelsemiljöer utanför staden, KK-Allmio, see n. 636.'
that would become part of the Visitor Center concept, and one of these ideas was to set up a copy of the largest rocket that had been launched from Kiruna—a rocket named Maxus. The rocket would be placed by the entrance to the Visitor Center in order to ‘awaken awareness and curiosity in the visitors.’

By 2008, the plans for the Maxus rocket became reality, due in large part to the efforts by the local politician Lars Törnman. The conspicuous rocket was placed by the bus station near the E10 motorway that connects to the airport—in other words, it was difficult for visitors to avoid seeing it (see Figure 6.1). There was a small inauguration ceremony on 10 June 2008, and the Chair of the Kiruna Municipal Council, Kenneth Stålnacke (b. 1960), proudly stated: ‘We have been missing something that shows that Kiruna is a space town. Now we have it.’ Thus, it was evident that the local officials regarded the rocket as an important symbol for the ‘space town’.

Finally, the illustration in the beginning of the INTRODUCTION chapter is worth noting on once again. The picture is from Kiruna Municipality’s ‘Space Town Kiruna 2020’ development programme, published in 2008. In connection with this illustration, I asked how Kiruna Municipality officially promoted itself as a so-called space town when it was historically known more for its Saami culture and mining industry.

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642 The idea of putting a rocket on display has also occurred in other places around the world. One notable example is the industrial town Korolyov (Korolev) in Moscow Oblast, Russia, a town that is often referred to as the ‘space capital of Russia’ because of the developments in the space industry that took place there in the post-war period. There is a rocket on display by the entrance to the city.

643 KK-Allm5, see n. 1.
The 2020 development programme was signed by a coalition of actors representing several societal functions both locally in Kiruna and regionally. These included Stålnacke; Lars Persson (b. 1956), President and CEO of Rymdbolaget; Pia Sandvik Wiklund (b. 1964), Vice-Chancellor at the LTU; Lars Eliasson (b. 1950), Director at the (IRF); Dan Tannerdal (b. 1967), principal at Malmens Rymdgymnasium, the space-oriented upper secondary school; and Bengt Jaegtnes (b. 1969), CEO at Progressum, the office for trade and industry at Kiruna Municipality. Their programme listed a number of aspects they considered to be part of the ‘space town’, such as the Esrange rocket facility, the IRF, the Space Campus, and the Malmens Rymdgymnasium. These and other activities and material installations are what constitute the space town: ‘The town of Kiruna is increasingly marked by the space activities and this is visible in the decorations of the public space and by all entrances [to the town].’

Central to this programme was an ambition to involve new actors by suggesting a number of new activities. Here, my focus is on one of these—the idea of commercial space travel for private individuals. Initiatives to establish commercial space travel had already been started in different parts of the world, such as the plans by the company Virgin Galactic. Kiruna did not want to fall behind this development and aimed to ‘establish Europe’s first and obvious place for commercial space travels for private individuals’. Another development, which contributed to this ambition, was the event that took place on 9 December 2006, when the particle physicist Christer Fuglesang (b. 1957) became the first Swedish astronaut. His space walks outside the International Space Station caused a kind of space fever among the Swedish population. Because of this intensified interest in space in combination with the new developments in commercial space flight, a number of actors—Rymdbolaget, Progressum, the Civil Aviation Administration, and the ICEHOTEL—formed a company called Spaceport Sweden. Rymdbolaget envisioned this newly formed Spaceport Sweden to become ‘Europe’s central place for space tourism’.

In January 2007, Spaceport Sweden managed to sign an agreement with Virgin Galactic, who found Kiruna interesting in part because of the potential to see northern lights during a space flight. The idea was to let tourists see northern lights up close rather than from the ground as was the traditional way of observing the phenomenon. These flights were thought to start in 2012, although for a variety of reasons this has been postponed several times. The agreement between Spaceport Sweden and Virgin Galactic was an important


648 As of this writing, the international ambitions to establish space flight have been further postponed due to a fatal accident in a test flight in New Mexico, USA.
symbolic event for Kiruna. The Swedish Minister for Enterprise and Energy, Maud Olofsson (b. 1955) inaugurated Spaceport Sweden on 26 January 2007 at the Arena Arctica facility at Kiruna Airport. In her speech, Olofsson talked about how space tourism could be combined with other cultural activities, and she also made a reference to the ongoing ambitions to relocate the town of Kiruna:

I really hope that this will be successful. Of course, the space journey from Kiruna Spaceport will be a splendid attraction for tourists who want to see the aurora much closer than you can see it from here, who can combine their journey to space with a night at the ICEHOTEL, visiting Esrange, visiting the mine, and eating all the splendid food that we have in this region. So, I feel quite confident to say that the city of Kiruna is really in the move.

Thus, it was not only about sending tourists into space. Olofsson also talked about business connections, an idea that is also mentioned in the 2020 programme. According to the 2020 programme, it was about establishing new businesses close to the spaceports forming around the world, as well as development of new materials, technologies, commercial services, and products. By establishing Spaceport Sweden in Kiruna, the coalition of actors behind the initiative hoped to develop new groups of users of these space services and to have Kiruna develop and offer an increasing amount of products and services for these new actors. In other words, this fits in well with the developments that have been analysed and described throughout this study; by adding something new to the space town, it would lead to a kind of spiralling effect that would make the activities expand further. The 2020 programme referred to these new ambitions as ‘The second space age’ and described how they facilitated new ways to collaborate between industry and public actors, new ways to finance research, and new ways to collaborate internationally.

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651 Original quotation: ‘Den andra rymdåldern’, KK-Allm5, see n. 1: p. 5; Regarding this notion of a second space age, see Peter L. Hays & Charles D. Lutes. ‘Towards a theory of
As reflected in Olofsson’s speech, the idea of this new form of ‘space tourism’ was to offer tourists a package deal that would include visits to Esrange as well as the ICEHOTEL. Significant parts of this package deal were the northern lights and wilderness. However, although the ideas of a Visitor Center and space flights have been in the making since at least the 1980s, they have still not been realised. What the future holds remains to be seen, and perhaps the continued development of this space tourism is a topic for future scholarly research.

DISCUSSION: MAKING PLACE FOR SPACE

As stated in the opening INTRODUCTION chapter, the overall objective of the present study is to examine the processes behind the making of Kiruna as a space town in the period 1943–2000. This would be achieved by identifying the arguments that different actors involved used when making connections between Kiruna and the near space around the earth and by describing how they had implemented these linkages through activities and material installations.

The following sub-sections will discuss the overall findings and conclusions with regard to four themes. The first of these concerns the notion of Kiruna as a place for knowledge.

THE EMERGENCE OF A KNOWLEDGE PLACE

In a broader perspective, the present study of Kiruna can be seen as a case study of a larger global phenomenon where specific places become famous for their strong connections with scientific or technological activities. The


653 Worth mentioning is also a 1999 investigation on the potential to establish ‘research tourism’ in Kiruna. This idea was allegedly raised by the Director of the Environment and Space Research Institute, Thomas Palo (b. 1954). Jenny Stridsman, Forskningsturism – Ett komplement till befintlig turistnäring?, Lärande i Arbete (LIA) Rapport II, 1999-03-15. Vol. II. MRI (Miljö- och Rymdforskningsinstitutet). Kiruna Kommuns Centralarkiv, Kiruna (henceforth cited as KK-MRI1).
Introduction chapter emphasized how such places can be rather different from each other in a number of ways, for example with regard to their physical size, form, and dispersion. There is a slight confusion of terms in this research field, and scholars do not necessarily agree on how to define different types of knowledge places. Consequently, the previous research has used terms such as science cities, technopoles, innovative milieux, and regional clusters when talking about these phenomena.

Kiruna’s path to becoming a knowledge place can be said to have started in 1948 with the establishment of the KGO just outside the town centre, but it can also be said to date back to the first scientific research station in Vassijaure, a location that is part of the present-day Kiruna Municipality. Regardless of when the starting point was, the genesis of Kiruna as a place for knowledge was about scientific activities, with an emphasis on basic science. The aim of the space activities at this stage was primarily the scientific interest. The space-oriented scientific activities (along with the other scientific activities) were soon moved to Abisko, and later to the KGO. Thus, by the time the KGO was established, there were no other material installations or activities in Kiruna Municipality relating to space activities. The research station in Vassijaure had burned down and the research station in Abisko was focusing on other scientific fields. Although there no explicit references to Kiruna as a ‘space town’ at this point, there were notions about Kiruna having a potential to further develop into a place for knowledge.

It is also interesting to note that the KGO had connections with other parts of Sweden and abroad. In Sweden, the most evident connections were with Olof Rydbeck’s team at the CTH and with UMU through Bengt Hultqvist’s professorship and the postgraduate education. Internationally, the KGO was part of the IGY, which consisted of a network of observatories around the world. Consequently, Kiruna did not emerge as a knowledge place in isolation from other places.

The next phase of this development was the establishment of the Esrange sounding rocket field. Even though the scientific activities at the KGO continued in parallel, Esrange added a new layer to Kiruna in terms of space technology and space engineering. Added to this was the temporary rocket experiments in the neighbouring Jokkmokk Municipality that, despite not being permanent activities, contributed to making the region known for space
activities. One of the central motivations to establish Esrange in Kiruna was the fact that the KGO was already there. Even though Esrange was placed some thirty-two kilometres away from the KGO, it was still in the vicinity of the KGO if seen in a larger regional or national perspective. The sparsely populated region contributed to making the KGO and Esrange stand out more compared to if they had been placed inside a larger city.

Moreover, with the addition of Esrange, an agglomeration of space-related structures had emerged. Together, the KGO and Esrange constituted the simplest form of a regional cluster in the sense that at least two interconnected activities were growing closely together. When the KGO and even more so when the Esrange were inaugurated, some actors talked about Kiruna in terms of being a centre for scientific activities or even literally a ‘space town’. By doing so, they contributed to the social construction of Kiruna as a particular place for knowledge.

The making of Kiruna as a knowledge place took on entirely different proportions in the early 1980s when Kiruna Municipality made a deliberate effort to promote the town as a ‘future town’, in part by finding inspiration in other knowledge places such as Silicon Valley and Milton Keynes. Similar efforts took place around Europe in the post-1980 period, for example the two German science cities Garching and Munich (or ‘Municon Valley’) that both had fetched elements from the Silicon Valley concept.

The establishment of the Space House and the different activities connected with it, in particular the satellite imaging business, added another layer to Kiruna as a ‘space town’. With regard to the clustering, the Space House was placed centrally in the town of Kiruna, making the space activities more conspicuous but also appear more integrated with the rest of the town compared to Esrange and the KGO that were both placed further away from other buildings, roads, and places where people tend to gather or travel. By placing the Space House centrally, the space town literally included the town itself rather than being placed only outside the town centre, as was the case with the KGO and Esrange.

Added to the agglomeration of different space activities were also the

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eiscat and the alis networks, although their contribution was of a different form in that they consisted of separate nodes spread out over large areas, in particular eiscat that was placed in three different countries. Like the kgo being part of a wider network of observatories, the presence of the eiscat antenna and headquarters in Kiruna emphasized Kiruna’s mutual connections with other countries. Moreover, both eiscat and alis challenges the notion of Kiruna as a space town in that the two networks made the spread of physical structures more distinct. This form of extreme dispersion makes it motivated to ask what counts as growing ‘closely together’ in a regional cluster. Surely, clustering must be considered relative to a point of reference.

Another important layer in Kiruna’s emergence as a knowledge centre was higher education. It is interesting to note how the existing space and information technologies, at least to some degree, merged with environmental studies. In other words, this challenges the notion of what counts as ‘space’ activities. With regard to place-making, the establishment of the Space Campus was another fundamental contribution. The mass media reported on the inauguration by talking in terms of Kiruna as a space town. The politics involved in the planning of the higher education also emphasises and complicates the relevance of the region for the space town concept. While the universities in Umeå and Luleå were not directly part of the ‘space town’ idea as such, it is relevant to consider them in the broader regional perspective and ask to what extent they can be seen as part of the regional clustering of space-related activities.

Finally, a fifth layer in the emergence of Kiruna as a knowledge place is the recent efforts to develop a space tourism industry. This was seen as a new platform to make the space town grow further by connecting different businesses with the northern lights above the earth. Put differently, this was seen as another way—in addition to, for instance, the balloons or the sounding rockets—to make the vertical place above Kiruna part of the notion of the space town. Kiruna’s space activities were not only about the geographical clustering on the ground; they were also about a form of vertical expansion, where the upward exploration can be seen in contrast to the downward mining activities. In addition, the horizontal and vertical expansion could be seen in comparison with the ongoing plans to relocate the town of Kiruna.

One interesting observation to be made based on the development out-
lined above concerns the paradoxical notion of how different forms of space activities ‘clump together’ in one concentrated place, while also sprawling across a large area. Kiruna as a ‘space town’ consists of physical structures that are scattered around much of Kiruna Municipality’s area (about half the size of Switzerland) and, to some degree, even outside this area into neighbouring municipalities in Sweden, Norway, and Finland. A recurring motivation to placing these activities and structures near Kiruna town has been to have access to the conveniences that a population centre can offer in terms of accommodation and other services, and to allow for easy transport by land or air. However, while the proximity to the town of Kiruna has been important, it has also been an obstacle, especially in the case of Esrange but also, for example, in the case of KGO, which had to be placed at a safe distance from the electromagnetic interference that occurs near power lines. Thus, Kiruna space town emerged largely as the result of this balance between being both close to and isolated from a population centre. Another reason why the different physical structures, especially the ALIS and EISCAT networks, have been scattered over large areas is their need to have large distances between individual instruments to increase the accuracy of the scientific observations and measurements. The overall consequence of such developments has been the creation of a cluster, still in the making, of physical buildings and other structures that cover a region while also being largely centred on the town of Kiruna.

In connection with this, several of the cluster’s constituent parts can be seen as smaller clusters or clumps in themselves. For example, as of this writing, the Esrange base area includes numerous buildings, stations, antennas, and other technological structures that form a local agglomeration interconnected by a network of roads particularly built to connect these facilities. Another example is the Space Campus with its collection of buildings and other structures scattered around the site.

Thus, in the case of Kiruna, it is not so much a matter of the population centre or town itself that constitutes the knowledge place, but rather the area that is defined by the municipality. Moreover, as suggested, it is possible to consider an even wider area, which would make the knowledge place or a
form of macro-place rather than a meso-place.655 As such, it is possible to think of the northernmost Swedish area in terms of a space region, much like, for instance, southern California can be described as one.656 Yet, the relatively small town of Kiruna is at the centre of it all. In connection with this, it can be noted that several successful knowledge places started as rather small population centres. Swedish examples include Uppsala, Lund, and Umeå.657

Another observation is to what extent Kiruna as a ‘space town’ can be said to have emerged as the result of deliberate planning. Previous studies have shown how some forms of knowledge places have been deliberately planned, while others have emerged more spontaneously. Overall, Kiruna has a history as a planned city, from the time of its foundation to the recent plans to relocate the town. Kiruna as a ‘space town’, however, is a different matter. The emergence of Kiruna’s space activities was governed by different interests groups on different local, regional, national, and international levels rather than by one central authority, as is often the case with centrally planned knowledge places. To be sure, at least three of Kiruna’s most fundamental space activities and structures—the KGO, Esrange and the Space Campus—have been the subject of governmental investigations. Esrange was to a large extent the subject of European governance. However, in all cases it was a matter of governments intervening in processes that had already been set in motion by other interests groups, rather than the government initiating the processes. Another form of deliberate planning was the efforts by Kiruna Municipality to promote Kiruna as a ‘future town’. It is noteworthy that this place-making initiative was largely inspired by similar developments in places such as Silicon Valley and Milton Keynes, where the latter was a town that had been centrally planned. However, although the ‘future town’ concept can be seen as a form of central planning, it was done primarily by local authorities rather than the national government, and the planning was based on activities already in place rather than intending to start something new from scratch. This shows that Kiruna’s space activities overall were governed by interests groups on different geographical levels including local, regional,

655 Baraldi, Fors & Houltz, ‘Introduction’, see n. 15.
656 Westwick, Blue sky metropolis: the aerospace century in Southern California, see n. 70.
national, and international (primarily European) levels.

In conclusion, Kiruna as a 'space town' developed mostly in a spontaneous or 'organic' manner, where the different activities and physical structures were added in successive layers and where each new layer was, to some extent, based on what was already in place. With regard to the geographic clustering, while the space activities and the physical structures connected with these can be acknowledged as having formed Kiruna as a 'space town', they can also be considered to have formed a regional cluster that encompasses more than the town or the municipality itself.

As should be clear from the INTRODUCTION chapter, there are aspects of Kiruna's space activities and facilities that have not been analysed in this study, for example, the Upper Secondary Space School (Rymdgymnasiet) and the Bengt Hultqvist Observatory connected with this. Moreover, I have not studied in detail the developments that took place after the different activities and structures were established. These have certainly contributed to the notion of Kiruna as a space town. Consequently, there is more research to do with regard to how Kiruna emerged and developed as a knowledge place.

Wilderness, technology, and space

Another theme that can be distinguished in addition to Kiruna as a technopole, science city, or other form of knowledge place is the connection between 'wilderness' and technology. The nature in Kiruna Municipality has been referred to as the last wilderness in Europe. At the same time, some of the most advanced high technology is in the same municipality. Here, I will discuss the contrast and harmony between the two.

Some technopoles have been created from scratch in previously empty places where there is relatively untouched nature, while others have been built in existing cities. Given this simplified distinction, Kiruna—if seen as a technopole—might appear to belong to the latter category; first there was Kiruna town, and later the space town technopole. However, as shown, this matter is complicated by a range of factors, for example, that many of the space-related structures have been set up in the nature that surrounds the town and the villages of the Municipality.

The MAKING PLACE FOR SCIENCE chapter began by showing briefly how
the northern Swedish region was to a large extent a blank spot on the map with
gards to research activities in the geophysical sciences. When the KGO was
established, one important motivation for its location in the north of Sweden
had to do with this region being in the northern auroral zone. Moreover, the
observatory was set up some eight kilometres outside Kiruna town rather
than more centrally. The reason for this was that it had to be secluded from
disruptions that could interfere with the scientific instruments. Many of these
instruments were very sensitive to electromagnetic variations, and as such
were best placed far away from major power lines such as those that provided
the iron ore railway and Kiruna with electricity. At the same time that there
was a need to be relatively isolated, there were also a range of motivations to
locate the observatory near a population centre and transportation routes.
Thus, already at this stage, it became clear that not only did the place of the
scientific activities matter a great deal, it was also important to be situated in
a secluded place while also having access to public services, social life, and
infrastructure.658

Additional aspects of the relationship between technology and nature
became apparent when the Esrange rocket launch site was established. Above
all, the potential risks involved in the rocket experiments had side effects on
how the ‘wilderness’ of the rocket field had to be secured, for example, by
having warning signs, fences, and artificial shelters. But it was also about
adjusting to the seasons of the Saami reindeer herding practices. Thus, as
the chapter showed, there was a mutual dependency between the rocket
experiments and the Saami culture.

The rocket and satellite technologies were also important complements
to the ground-based instruments. Although the latter have remained a funda-
mental part of the observation technologies, the rockets and satellites (and
to some degree, balloons) enabled observations deeper into the near space
around earth. So far, it has been mostly about exploring the near space, but as
the epilogue about space tourism showed, there are also ideas about commer-
cial exploitation. This can also be seen as reaching new, hitherto unexplored
parts of nature. In Kiruna, this phenomenon becomes particularly interest-

658 Livingstone, Putting Science in Its Place: Geographies of Scientific Knowledge, see n. 14:
p. 40—48; Thomas F Gieryn. ‘City as Truth-Spot Laboratories and Field-Sites in Urban
ing in relation to the mining activities that, similarly, reach deeper into the unexplored parts of the earth with the intention to scientifically research and commercially exploit the natural resources located there. In both cases, there are also technological challenges involved.

While on the topic of satellite technologies, it is also noteworthy that Kiruna was an important part of the initial developments of satellite imaging technology, which to a large extent was used in mapping the nature of earth in a way that had not been possible before.659

In conclusion, very few physical structures were situated in the town of Kiruna itself. By necessity, many scientific observatories and measuring stations were placed in remote locations. This was often not a problem because of the large area that Kiruna Municipality encompasses, and the fact that it is an extremely sparsely populated area. There has been a lot of space in Kiruna in more than one sense; besides the notion of space as in space science and technology also the notion of territorial space that had been ‘empty’ or ‘wild’. However, as the study showed, most clearly in the conflict between ESRO’s Esrange rocket base and the Saami villages, this idea of wilderness and emptiness was far too trivial.

Research into this contrast between technology and wilderness can be further developed. For example, it would be interesting to study the connections and contrasts between the recent mining prospecting, the reindeer herding, and the rocket activities in the Esrange area. While the rocket activities may seem to have little interests in common with the reindeer herding industry, neither want mining prospecting in the area and consequently both parties oppose the prospecting companies that try to explore the area for mining activities. In connection with this, it would also be interesting to study in more detail the other interests in the area such as tourism, hunting and fishing, and other forms of recreation.

A third theme that might deserve to be investigated is the industrial heritage and how the different space activities and structures leave traces in nature when they become abandoned. For example, there are remains of the

rocket experiments in Jokkmokk Municipality. Similarly, there must be traces of early built structures and experiments throughout Kiruna Municipality. What happened to the first buildings that formed the KGO? What happens to rocket debris that has not been collected after falling down?

THE PLACE-BOUND SPACE IDENTITY

The Introduction chapter explained how the use of Anssi Paasi’s analytical framework on the identity of a region made it possible to consider a form of ‘space town’ identity emerging in Kiruna. This process has taken slightly different forms throughout the study.

The first empirical chapter, Making Place for Science, describes how the geophysicists changed the focus of their perspectives from the greater Arctic region to the area that made up the north of Sweden. Those geophysicists who were interested in the northern lights came to discover and define the elliptical auroral zones in the near space above the north and south poles of the earth. Kiruna’s geographical location under this auroral zone was later used as one of the main arguments when establishing the activities and material installations that centred on the scientific study of the auroral lights. This was an act of delimiting the near space around the North Pole as something unique, and consequently making Kiruna part of the geographical area on earth from where these lights could best be studied. In this process, I argue that the scientists were involved in (to borrow from Paasi) an ‘objective’ scientific classification of the region around Kiruna. This was the first major step towards the making of a ‘space town’ identity, although at the time the concept of the ‘space town’ was not yet formed. It was a way for the scientists to say that Kiruna was part of a unique region, somewhat loosely defined geographically but nevertheless something that made the region distinguishable from other regions outside the auroral zone. This new way of seeing Kiruna became more concrete when the KGO was established in 1957 as part of the IGY. This was an important addition to the image of Kiruna as a unique place intended for the study of the northern lights and other scientific activities in cosmic geophysics.

It can also be added that Kiruna was not the only place in the north of Sweden that claimed the northern lights in this way. For example, UMU has for
a long time used the northern lights as an element in its graphic profile, and in the middle of the main university campus in Umeå there is a monument portraying the northern lights. Also, as shown, Kiruna and Sweden has been in ‘competition’ with other countries with regard to the studies of the northern lights; this also has a bearing on the identity-formation, and, consequently, also on the place-making.

In addition, the KGO’s participation in the IGY also can be treated as a form of identity creation, that of the KGO being part of a larger scientific network. However, in the case of the IGY, it was perhaps more a matter of delimiting, naming, and symbolizing an abstract space more than a specific geographical region.

In the next empirical chapter, Making place for technology, a number of other contributions to this still rather vague identity took form. The first was the Swedish participation in ESRO, which can be seen as a matter of national identity rather than a regional identity. By joining ESRO, Sweden had something in common with the other ESRO nation members, and much like Paasi talks of a regional identity in the EC, it is also possible to consider a regional identity among the ESRO nations. In addition, Sweden was not just any member nation. Because of the country’s unique location in the auroral zone, Sweden had a rather central function in ESRO, which is evident from the relevance of the Swedish delegates during the establishment of ESRO. Thus, in addition to the formation of the identity of Kiruna in connection with the auroral zone, there was also a second kind of identity in connection with the ESRO collaboration.

It is also relevant to mention here the first rocket launch campaigns in Nausta and Kronogårds, both in Jokkmokk Municipality south of Kiruna Municipality. These were relevant to the regional identity, and because they took place outside Kiruna, they complicate to some degree the idea of Kiruna as a space town. As mentioned earlier, perhaps it would be relevant to think of a space region instead. However, the Jokkmokk activities lasted only a few years in the 1960s and later did not have anything of relevance to do with the formation of Kiruna’s space activities, other than the historical connection.

Another important step was the establishment of the Erange rocket base and field to the east and north of the town of Kiruna. In particular, the rocket field was a clear example of how scientists, politicians, administrators, and
others wanted to distinguish the area not only from the surroundings but also from what was already there. To the Saami, the area where Esrange was placed was primarily about their reindeer herding and culture. However, to ESRO the same area was primarily about rocket and space activities. Even though ESRO made a deal with the Saami, the Saami became more restricted in their herding activities. This fits in well with Paasi’s notion of how the identity of a region is constructed; and it is reflected in the ambiguous title of this dissertation, where the Saami had to make place for space activities in the sense of making way for the new industrial activities. Thus, from the space identity perspective, it was a way to both literally and symbolically define a boundary between those who do and do not belong to the space sector. Still, it is interesting to note how the deal between ESRO and the Saami allowed for both parts to share the same area.

Moreover, the physical structures at the base and around the rocket field contributed to what the sociologist Thomas Gieryn has referred to as place attachment, also in the context of the built environment. He has talked about how ‘residents of neighbourhoods near prominent landmarks[…] are more likely to have stronger emotional bonds to where they live.’ Esrange, or at least parts of it, was a distinct form of landmark. Even though it was not clearly visible for the public, the launch tower and the many antennas around the Esrange area have been shown in newspapers, on television, and appeared in numerous books and other publications. These are different forms of prominent landmarks in the sense that they stand out in contrast to the surrounding spaces.

The identity-making process became more pronounced in the third empirical chapter, Making place for business, where local politicians together with scientists, entrepreneurs, journalists, and other actors deliberately made an effort to promote Kiruna as a ‘future town’, starting with the Vision 84 conference. Although they did not yet officially label Kiruna a ‘space town’, the ideas of space and information technology were embedded in the ‘future town’ concept. Because this was an attempt to create an alternative industry to the vulnerable mining industry, it was also a challenge to—but not replacement

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660 Gieryn, ‘A Space for Place in Sociology’, see n. 82: p. 481.
661 Ibid.: p. 472.
of—the traditional mining identity. Kiruna was going to be associated with information and space technologies in addition to the mining industry.

With regard to the place-making processes, the large EISCAT antenna added significantly to the identity of Kiruna because it was clearly visible to residents of Kiruna, as well as others who observed or knew about this landmark. Perhaps even more so than Esrange, this antenna contributed to a form of place attachment and a sense of Kiruna as a place for space activities.662

In the fourth empirical chapter, Making place for education, the identity of the space town further expanded to include not only science, technology, and enterprise, but also education. The Space Campus became the symbol for this, and the fact that it had an English name rather than Swedish is a sign of the intention to reach out to the world rather than only regionally or nationally. The notion of space science and technology at the Space Campus also became more integrated with the environmental studies, which surely has had an effect on how people imagine the space town concept.

As shown in the epilogue in the beginning of in this chapter, the Maxus rocket monument by the E10 motorway opposite the town hall in central Kiruna was yet another landmark that surely has caught the eyes of many passing tourists, whether they stop in Kiruna or drive through on their way to Norway or the Swedish coast.

Another aspect of the identity-making process involves the naming of places such as geographical areas or material installations. Gieryn remarked that ‘Without naming […], identification, or representation by ordinary people, a place is not a place.’663 Moreover, in the words of the geographer Yi-Fu Tuan: ‘Naming is power—the creative power to call something into being, to render the invisible visible, to impart a certain character to things.’664

The most distinct act of naming was when Kiruna was promoted or described as the ‘future town’ and ‘space town’, but it is important to remember Kiruna also had epithets that did not relate to the space activities such as the mining town, the military town, the model town, and the winter town. Kiruna is not the only Swedish place to have been named for the purpose of

662Gieryn, ‘A Space for Place in Sociology’, see n. 82: p. 481.
664Tuan, see n. 260: p. 688.
promoting the economy. For example, Swedish regions have been denoted the High Coast (Höga Kusten), the Kingdom of Cheese (Ostriket), the Kingdom of Crystal (Glasriket), and the Kingdom of Furniture (Möbelriket). It is notable that it is often regions that are being named in this manner.

However, there were other ways of naming in the context of Kiruna’s space activities. For example, the naming of the rocket base Esrange was an act that transformed the large geographical space that the rocket field encompassed into a specific place connected with space activities, despite the fact that this space already had a history associated primarily with Saami reindeer herding. The four Saami villages that occupied that space each had their own name, but with this new process there was suddenly a competing identity. However, as the American historian Robert E. Sullivan has pointed out in response to Tuan, the naming process can also be a matter of making something invisible: “The new name can also render the visible invisible, call things “out” of power, and efface numerous characteristics of things: witness the repeated erasures of Indian territories by the mere inscription of new names on them or the ascription of terra nullius to terra that were not nullius at all.” The four Saami villages experienced something similar, and this is evident, for example, in the topographic maps published by the Swedish National Land Survey, where the area includes the borders of the Esrange rocket field but not the borders of the four Saami villages. As mentioned earlier, this can be seen as a form of making place for space activities.

Other examples of the naming process are when the new Space House was given its name, when the streets and blocks in the Lombolo borough of Kiruna were given space-themed names, and when the naming of the

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Space Campus. It should be noted here that my study has not included, for example, the naming of the school Rymd gymnasiet.

How can the construction of this space town identity be explained in a wider context? I reason that it comes down to being about a way for Kiruna to maintain a unique character in a world that is being globalised and modernized, where towns and cities can be said to become more similar to one another. The making of the space identity as a way to put Kiruna on the map is, therefore, relevant not least in the European context where promoters try to establish an integrated European identity.

An important part of the regional identity is the people who in one way or another can relate to the space activities. Judging from the four empirical chapters, the people involved in the different phases have almost exclusively been men. However, this does not mean that women have not been involved. Because this study focuses on the development phases, it has been inevitable to concentrate mostly on those committees, boards, and other bodies that have governed the development processes. Generally, the lack of women in such bodies has deep historical roots in Western cultural beliefs about gendered separation, where women should inhabit the domestic sphere and men the public sphere.

However, there is another aspect of this; the lack of women in the governing bodies does not necessarily mean there is a lack of women involved in Kiruna’s space activities more broadly. In the research for this thesis, I have come across several female names in the documents, even in leading positions as directors and scientists, and I have interviewed one of them. However, the study has included persons based on their relevance to the research aim and questions rather than their gender, ethnicity, or other personal characteristics. Although previous research has investigated the matter of how Kiruna’s space

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667 For an example of how another ‘science city’ has caused the local authorities to name the streets after the scientists, see Heßler, ‘Science in the City: European Traditions and American Models,’ see n. 654: p. 219; Another concrete example is the naming of Cape Inscription, the site on the Australian continent where Europeans first arrived. Paul Carter. The Road to Botany Bay: An Exploration of Landscape and History, University of Minnesota Press, 2010. P. xxiv.

668 See also Hård et al., see n. 418.

669 Berner, see n. 49; Londa Schiebinger. The mind has no sex?: Women in the origins of modern science, Harvard University Press, 1991.
activities are gendered, there is more work to be done in this area.\textsuperscript{670}

There is obviously more research to do with regard to the ‘space’ identity of Kiruna. For example, it would be interesting to investigate the gender aspects of the different space activities and how they relate to the mining activities which have been associated with masculinity. Another interesting approach would be to relate the identity of Kiruna as a space town to other places that have a similar kind of identity, whether nationally or internationally.

**Kiruna in the making**

Finally, a fourth theme is relevant to include in this discussion. It concerns the overall picture of how Kiruna’s development can be explained more broadly. I will discuss this by relating to the three research questions that were presented in the beginning of this dissertation.

The first question was: *How have knowledge of and ambitions to better understand and use the near space around the earth influenced and transformed existing as well as new space-oriented activities and material installations in Kiruna?* In order to answer this question, it is important to emphasize that the space activities in Kiruna have not been of one specific kind but rather a combination of many different forms of activities including scientific, technological, business enterprise, education, and tourism. Because there have been groups with different interests, they have also had different motivations for understanding, interpreting, or using the near space around the earth. For example, in the case of the space physicists the interests has been dominated by scientific curiosity, in the case of the satellite-imaging business there have been primarily economic motivations involved, and in the case of the space tourism there have been elements of leisure and adventure.

When these interests groups developed their activities in Kiruna, they contributed to adding new layers to what was already in place, where the

\textsuperscript{670}For the Kiruna study, which focuses on the IRF in Kiruna, see Berner, see n. 49: pp. 104–127; Nilsson, *Kiruna : staden som ideologi*, see n. 48: In his study on different ideologies in Kiruna, the ethnologist Bo Nilsson has included ideas about gender and masculinity. For a perspective on gender in the.Europan Space Agency, see Zabusky, see n. 39: For some American and global cases, see Margaret A Weitekamp. *Critical Theory as a Toolbox: Suggestions for Space History’s Relationship to the History Subdisciplines*, ed. by Steven J Dick & Roger D Launius. Government Printing Office, 2006: 564ff.
scientific interest was the first such layer. It is important to emphasize here that the new layers added to, rather than replaced, the existing layers. Thus, it would be too simplistic to say that the ‘space town’ of Kiruna emerged out of scientific or technological interests and activities alone. Surely, these two areas make up a fundamental part of the space activities, but, as the study has shown, there have been other important ingredients involved such as business, education, and tourism.

The second research question was: How have these space-oriented activities and material installations in turn generated new ideas and knowledge of importance to the notion of Kiruna as a space town?

It is important to understand that the different activities mentioned in the answer to the first question have not developed in isolation from each other. The different layers that have emerged have inevitably had an impact on the space activities at large and, consequently, on how each of the specific activities have formed. For example, when there were negotiations regarding where to place the ESRO rocket base, a central argument in favour of Kiruna was the fact that the KGO was already there. This is not to say that rocket base would not have been placed in Kiruna even without the KGO being there; the interesting aspect is that the existence of the one contributed to the existence of the other. Another example is how Kiruna was chosen as the place for the satellite-imaging business enterprise. In this case, it was above all the fact that Esrange was already there—with much of the required infrastructure and technological expertise—that contributed to the satellite-imaging activities to be placed in Kiruna.

In this manner, the existing activities and the physical structures that are connected with them have often been important motivations to adding new activities and structures to Kiruna. To make an analogy, this development can be compared to how an onion grows layer by layer. On the one hand, the onion gets nourishment from the new ideas that are carried forward by the different actors and groups involved, whether it is ideas in science, technology, business, education, or tourism. On the other hand, the actual layers of the onion consist of the concrete activities and the physical structures connected with these activities. As the onion adds new layers and grows, it will inspire to new ideas that will add new nourishment, and so on. Thus, it is the mutual interdependence between ideas and activities that make the space
town develop.

Of relevance to this process, both with regard to the first and second research question, is also the many different actors and groups involved. On the one extreme there are the governments and other large and powerful organisations that have governed the decisions. On the other extreme are individuals who have acted as driving forces, for example, entrepreneurs and local enthusiasts. In addition are many other actors and groups including scientific institutions, the mass media, the public, and specific interest groups such as the Saami, representatives of tourism, nature preservation groups, the military, and many others. Overall, these groups and individuals have contributed in different ways to shaping Kiruna as a space town.

Finally, the third research question was: *In what way can places become ‘famous’ by inhabiting ideas, objects and functions connected with particular science and technology?*

Part of this answer is found in the two very questions above. The space town becomes famous much because of a mutual interaction between, on the one hand, the different actors and their ideas, and on the other hand, the activities and the physical structures. There has been continuity in how the new ideas and activities have added to already existing ones. Here, it is important to emphasize the historical development. Kiruna’s space activities have developed over a period of at least sixty to seventy years, depending on how one defines the starting point. Because the place has a history, it means it also has gone through celebrations of anniversaries, which have been written about in the mass media.

Another part of the answer is found in Kiruna’s ‘unique’ geographic location. The northern lights have been the common theme throughout Kiruna’s space activities. This was made possible because of Kiruna’s location in the auroral zone. Of relevance to making Kiruna unique was also its position close to the North Pole, which enabled for frequent contact with polar satellites. Other important elements included the presence of ‘empty’ and ‘isolated’ territory, but also the proximity to a relatively large population centre and transport routes. Based on these preconditions, different actors contributed to *making* Kiruna into a special place, in part by adding new activities and physical structures, and in part by social place-making processes. Ceremonies, the mass media, and different forms of publications were important in
making Kiruna famous. For example, newspapers wrote much about the King of Sweden and leading politicians and other symbolic representatives being present at the different inaugurations.

A third part of the answer is the combination of deliberate and more spontaneous efforts to designate Kiruna as a space town. The perhaps most distinct of these was when Kiruna Municipality promoted Kiruna as a ‘future town’. Another event was the launching of the Viking satellite. However, it should be stressed here that this study has only focused on some cases, and there are additional events and developments that have further contributed to Kiruna’s face as a space town, for example, Kiruna and Norrland was part of Sweden’s exhibition at the world exposition in Sevilla 1992.

In order to explain Kiruna’s fame as a space town it is also relevant to consider the notion of Kiruna as a ‘model town’ that has been not only in the making (which place is not?) but also, at different stages in its history, has been in the *remaking*. By this, I mean that the town in one way or another has been reinvented or renewed and the acts of renewal have involved both the physical place (e.g. the enormous project of relocating large parts of the town or the establishment of buildings dedicated to specific activities such as the space activities) and the mental image or idea of the place (e.g. Kiruna as a mining town or Kiruna as a space town).

The INTRODUCTION chapter mentioned how the ongoing relocation of the town of Kiruna has used the motto ‘the Model Town 2.0’. This captures the essence of the remaking aspect; replacing something old with something new that is an improvement of the old in one way or another—in this case, the improvement is that the town will rest on new grounds that are safe from mining activities, at least in the near future. Similarly, when Kiruna was first built, it was also a planned town. These two major events have taken place over 100 years apart rather than being a continuous historical process that has evolved over time.

Even though the development of Kiruna’s space activities is of a different character than the Model Town concept, I argue that the notion of the Model Town has had a bearing also on how people see the space town. Both concepts are about *remaking* Kiruna, and both are processes still in the making as of this writing. Regarding the space town specifically, its emergence was a remaking of the overall Kiruna. Successively, Kiruna became known also for
its space activities. It is important to emphasize here that the space activities was not about replacing but rather adding to other ways of knowing Kiruna. In addition, it is possible to consider how the space town has been remade ‘internally’, where the space activities started out with a primary focus on the natural science and gradually became remade as new types of activities were added; space tourism, for example, may seem to have little in common with the scientific interest in the near space around the earth, but both are elements in the remaking of the space town.

This dissertation has examined a case of how science and technology can contribute to making particular places become famous. By investigating how different space-related activities and physical structures that were connected with these agglomerated into what can be described a regional cluster, the study has combined in a unique way three different research fields, including broader history of science and technology, regional and local history, and research about place-making and identities. As a result, the study has discovered new elements in the broader research about how science and technology can have an impact on society.


Undersökningens analytiska fundament vilar främst på hur olika slags kunskapsplatser formas och utvecklas ur ett rumsligt perspektiv. Forskning har visat att sådana kunskapsplatser kan vara av en mängd olika sammansättningar, former och storlekar, varför det är av intresse att studera hur exemplet
Kiruna förhåller sig till dessa tidigare studier. Ett annat centralt teoretiskt grepp är så kallad platsskapande, där studien i första hand intresserar sig för hur olika aktörer ur ett socialkonstruktivistiskt perspektiv formar och omformar en plats och på så vis bidrar till att ge den en ny slags identitet.

Avhandlingen består av fyra empiriska kapitel följt av en epilog som inkluderar en kort empirisk studie. Materialet utgörs främst av arkivmaterial, offentligt tryck, massmediala publikationer, och intervjuer.


Även om inrättandet av KGO visade sig ingå i en sekvens av händelser som påbörjades tidigt på 1900-talet representerade KGO någonting markant nytt i det att verksamheten fokuserades på studiet av norrsken och andra fenomen i den så kallade nära rymden utanför jorden. Det vertikala rummet fick ny betydelse där utforskandet av rymden sågs som en ny möjlighet i kontrast till den befintliga gruverksamheten. En annan viktig iakttagelse rör det geografiska läget, där KGO till skillnad från stationerna i Vassijaure och Abisko placerades närmare Kiruna stad och dess bekvämligheter samtidigt som observatoriet av skulle vara relativt isolerad från störningar.

område inom Kiruna kommun, och trots att där fanns samebyar som bedrev rennäring kom raketfältet Esrange att etableras där och invigas 1966.

Ett motiv till att förlägga Esrange i Kiruna snarare än någon annan plats i Europa hade att göra med att Kiruna befann sig på gynnsamt läge för att med raketers hjälp närmare kunna studera norrskenet. I Kiruna fanns dessutom sedan tidigare rymdverksamhet i form av KGO. Här kan man tala om början till en slags anhopning eller agglomerering där flera verksamheter successivt bildar ett gemensamt kluster när de förläggs relativt nära varandra. På så vis kom denna plats i norra Sverige att gå från att betraktas som relativt perifer till att utgöra ett rymdcentrum, såväl nationellt som internationellt.

Regionalt uppstod en konflikt i och med att raketfältet kom att förläggas på samma område där fyra samebyar idrade sin rennäring. Denna tvist fick en åtminstone tillfällig lösning genom att samerna kompenserades med bland annat nya vägar och skyddsrum inom raketfältet, samt att raketsförsöken reglerades till att ske under vissa perioder på året. På lokal nivå fick kopplingen till det vertikala rummet en starkare framtoning med raketteknologin, och kom exempelvis att influera Kirunas stadsplan genom att gator och kvarter namngavs enligt ett rymdtema.


En aspekt som är av stor betydelse för studiens syfte och problemställning är kommunens medvetna satsning på att marknadsföra kommunen som en ”framtidsstad”, där konceptet omfattade såväl informationsteknologi som rymdverksamhet. Kapitlet visar hur denna lansering var en väsentlig form av platsskapande.

En annan poäng är att även i fallet med affärskomponenten spelade Kirunas geografiska läge en central roll genom att Kiruna befann sig på gynnsam latitud för att få mer regelbunden kontakt med de så kallade polära satelliterna. Återigen var det också, liksom i fallet med Esrange, betydelsefullt att det redan fanns rymdverksamhet i Kiruna. Intressant är också att med Rymdhuset blev rymdverksamheten mer påtagligt närvarande i centrala Kiruna. Tillsammans med EISCAT och ALIS bidrog Rymdhuset starkt till att ytterligare gyttra ihop olika grenar och former av rymdverksamheten till kommunen.

kom dock att tonas ner något och i takt med de internationella utvecklingen i början av 1990-talet blev det istället mer konkreta diskussioner om att satsa på olika slags rymdutbildningar. Diskussionerna handlade i mångt och mycket om var i Kiruna utbildningarna skulle förläggas, där det enkelt sagt blev ett val mellan centrala Kiruna och den plats strax utanför Kiruna som Institutionen för Rymdfysik (IRF, tidigare KGO) befann sig på. Denna tvist slutade med att ett Rymdcampus inrättades i anslutning till IRF.

Kapitlet visar hur frågan om geografisk närhet kom att spela stor roll i debatten om var utbildningarna skulle förläggas. Detta bör ses i ett vidare perspektiv av hur de olika byggnaderna och verksamheterna var utsträckta inom kommunen. Samtidigt visas hur rymdverksamheten inte endast utspelades på det lokala planet utan också på det regionala planet i form av samarbeten med de två universiteten i Umeå och Luleå. Denna aspekt kastar nytt ljus över frågan om inbördes avstånd och närhet, och vad som kan sägas utgöra eller representera konceptet ”rymdstaden”.


Avhandlingens första och andra forskningsfrågor löd: Hur har kunskapen om och ambitionerna att bättre förstå och använda den nära rymden påverkat och omvandlat befintliga samt nya rymdverksamheter och -anläggningar i Kiruna? och Hur har dessa rymdverksamheter och -anläggningar i sin tur bidragit med nya idéer och kunskaper till idén om Kiruna som en rymdstad?

Förekomna kan båda dessa besvaras samtidigt. Rymdverksamheten har byggts ut successivt, lager på lager. Utvecklingen kan liknas vid en lök som växer och successivt får nya skal. Å ena sidan får löken näring av de idéer som förs fram av olika aktörer och grupper. I studien rör det sig främst om fem olika områden: det vetenskapliga intresset för norrsken och andra fenomen i den nära rymden; den ingenjörsmässiga utmaningen att utveckla och skjuta upp raketer som ett stöd till den vetenskapliga verksamheten; den affärsriktiga ambitionen att nytta rymden som en resurs; idén om att den högre utbildningen ytterligare ska gynna rymdverksamheten och staden; och
slutligen förhoppningarna om att rymdturism ska kunna skapa nya affärsmöjligheter. Å andra sidan skapas lökens faktiska lager av verksamheterna och de fysiska byggnader och strukturer som är förknippade med dessa. Det intressanta är att det är båda dessa aspekter i samverkan som får löken att växa. Idéerna leder till nya lager av verksamheter och byggnader, och när helheten växer kommer det att öppna för nya idéer och möjligheter som ytterligare kan bidra.


Sammantaget bidrar studien till den internationella forskningen om hur olika former av kunskapsplatser och kluster bildas. Förståelsen av dessa
processer är betydelsefull i den större kontexten av hur vetenskap och teknik bidrar till att utveckla samhället.
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