

JOURNAL *of* NORTHERN STUDIES



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The *Journal of Northern Studies* is a peer-reviewed academic publication issued twice a year. The journal has a specific focus on human activities in northern spaces, and articles concentrate on people as cultural beings, people in society and the interaction between people and the northern environment. In many cases, the contributions represent exciting interdisciplinary and multidisciplinary approaches. Apart from scholarly articles, the journal contains a review section, and a section with reports and information on issues relevant for Northern Studies.

The journal is published by Umeå University and Sweden's northernmost Royal Academy, the Royal Skyttean Society.



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JOURNAL *of* NORTHERN STUDIES

Vol. 14 • No. 2 • 2020

Published by Umeå University & The Royal Skyttean Society

Umeå 2021

The *Journal of Northern Studies* is published with support from The Royal Skyttean Society and Umeå University at www.jns.org.umu.se

For instructions to authors, see www.jns.org.umu.se

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ISSN 1654-5915

Cover picture

Scandinavia Satellite and sensor: NOAA, AVHRR

Level above earth: 840 km

Image supplied by METRIA, a division of Lantmäteriet, Sweden.

www.metria.se

NOAAR. cESA/Eurimage 2001. cMetria Satellus 2001

Design and layout

Leena Hortéll, Ord & Co i Umeå AB

Fonts: Berling Nova and Futura

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LOTTEN GUSTAFSSON REINIUS

Special Issue

Tracing the Arctic; Arctic Traces

ABSTRACT Nowhere on earth is global warming happening as fast today as in the northernmost region. In many cases the situation is acute for both humans and other animals. But it is not only biotopes, but also long-since intertwined systems of nature and culture that are in accelerating processes of change. What was once portrayed as almost invincible is now associated with vulnerability. The situation is one of urgency for the four million people living in Arctic areas, but it may ultimately affect many more. The northernmost area on earth once again reminds us that humanity too has a limit. This introduction starts with a fieldwork note from contemporary Greenland, where the contested colonial heritage also exemplifies the entanglement and friction of global interests and environmental change. In this broadly multidisciplinary collection of scholarly articles the Arctic will be discussed both as nature and as culture, and in ways that stress change and complexity. Unexpected alliances and tentacular methods are crucial in our challenging times, according to environmentalist Donna Haraway. The contributions of this journal issue also share the context of support for a co-curated exhibition at the Nordiska museet on “The Arctic—While the Ice Is Melting” (from 2019).

KEYWORDS multidisciplinary collaboration, Arctic, climate change, collections, tentacular methodology, traces, Nordiska museet, co-curation, geo-cultural, colonial heritage

Tracing the Arctic. The Weaving of a Multidisciplinary Web

The atmosphere in Nuuk was marked by the presence in the harbour of a luxury cruiser.¹ Already at the airport I had run into mineralogists and other scientists from different parts of Europe, and now a Russian icebreaker had also cleared the way for a large group of well-off tourists. Some of the visitors ventured to bathe in the cold water while others tried out a kind of hang-gliding in pairs, and could be seen hovering in the high, clear air. They seemed to be moving in a fantasy landscape of adventure and play. Perhaps the small pieces of iceberg floating under them were a part of the attraction.

Ebb and flow meet in the old colonial harbour, traces of change and continuity. The racks at the boat club, filled with kayaks in different colours of plastic, are a reminder of how an invention with Arctic roots going back a thousand years has continued to evolve and spread around the world. A wooden church and some other houses from the eighteenth and nineteenth centuries are traces of the reverse movement—of outside influence.

Standing on a high hill is a statue of the Danish-Norwegian missionary Hans Egede, in his clerical dress with its characteristic ruff. At the foot of the base there is a reference to a Danish bronze foundry. A similar monument to “the Apostle of Greenland” stands in front of the Marble Church in Copenhagen.² The copy in Nuuk was erected in 1922, probably to mark the fact that two centuries had passed since the missionary’s ship cast anchor in the early 1720s, further out in the fiord. Egede had been entrusted with the task of making the inhabitants of Greenland aware of the Reformation and of the new claims of the Danish crown. The Norsemen who had settled in southern Greenland around the year 1000 were the intended recipients of the message, but by then they had died out or left Greenland. There are various theories about the cause, including the deterioration of the climate at the beginning of the Little Ice Age (Charpentier Ljungqvist 2017: 274–275). However, there were other people in the area, the Inuit who lived by hunting, and after seven years the parish and the colony of Godthaab was established (Thuesen, Gulløv, Seiding & Toft 2017: 46–67).

Monuments are among the societal technologies intended to give lasting recognition to certain selected people and events (for example Latour 1998; Frykman & Ehn 2007). Paradoxically, the medium also brings the possibility of iconoclasm and other ways of communicating critically about—and with—what was once given materiality and the status of cultural heritage (Latour 2002: 14–37). Egede’s statue in Nuuk is regularly the subject of tributes but it has also been repeatedly vandalized (Duran Duus 2012; Kruse 2015). When I visited the harbour in August 2016 the statue was adorned with a wreath while the base was sprayed with graffiti. Four years later the ambivalence even brought about a referendum.³ And although a majority of voters were in favour of the monument’s lingering presence digitalization keeps taking things one step further. On the Internet, images of Egede live on, covered with graffiti and paint, and they can be spread even after the traces on the actual statue have been erased.

The spiritual and moral dominance of the Protestant missionary is also challenged by an alternative monument. Rising from the water, just below the church and the hill where the missionary stands, is Sassumap Arnaa (in other contexts called The Mother of the Sea, Ímap Ukúa or in American Inuit tradition Sedna), in the form of a red granite statue that the municipality had erected in 2007 on a stone base just at the high tide limit.⁴ As in the myth, she is surrounded by the seal, the walrus, and the other animals of which she is the keeper and ruler (af Klintberg 1986: 21–25). A man is standing by this supernatural being, combing her long hair. According to the myth, a shaman has to mediate when the mighty mother of the sea has become so angry at the bad behaviour of humans that she keeps the animals of the sea in the depths (Rasmussen 1921: 5, ill. 84–85).⁵ Through the attraction exerted by the moon, the movements of the tide repeat the back-and-forth action of the myth. At high tide the figures disappear. At ebb tide they reappear, and the shaman has at least temporarily managed to assuage Sassumap Arnaa’s wrath. Tangles of filth, caused by humans, have been combed away and again the animals can become prey and food for them.

It is thus only at times that Hans Egede reigns alone on his hill, at once sullied and revered, a residue of the order of the colonial power and its system of values. Yet it would

be an oversimplification to interpret conflicts over the cultural heritage solely in relation to what is Danish. There was also criticism that the statue of Sassumap Arnaa was made of red Swedish granite; a foreign material was considered inappropriate to illustrate the power and the return of the Inuit tradition (Søgaard 2011).



Fig. 1. The colonial harbour in Nuuk in 2016. Photo: Lotten Gustafsson Reinius



Fig. 2. "Mother of the Sea" at low tide. Photo: Liv Arnesen.

In a long chronological perspective, the dialogue between the two statues is even more pointed. The ice sheet covering Greenland is the second largest on earth and is among the oldest ice on earth. If it were to melt in its entirety, the sea water, according to some estimates, could rise by six metres. Even now, some parts of the earth are drastically affected by rising sea levels. Can anything prevent us from moving towards a future when *Sassumap Arnaa* will no longer rise above the surface of the water? To put it in mythical terms, it will not be possible to appease her anymore. The ultimate moral of the tale is left to the elements and the future. In that light, the fact that *Egede* will remain in sight somewhat longer seems ironic but less relevant. If both these figures are swallowed up by the sea, the systems and relations they represented will also be but remnants of the human species that ought to have struggled more to deal with the damage it has caused.

The Limits of Humanity

In the circumpolar area in the far north, the land masses of America and Eurasia (and hence three continents) border on a frozen inland sea. In the Arctic, we also encounter the human species at its northernmost limits. Of course, no one has been able to settle as far north as the geographical North Pole, but people have been able to reach the edge of the ice somewhat further south. In the arctic mountain world and on the tundra along the rivers, there are places full of life where humans as well have found ways to survive through striking forms of adaptation to a harsh climate.

Whereas Antarctica, at the planet's other frozen pole, has remained unpopulated except for research expeditions and other occasional visits, the Arctic has since ancient times also comprised cultural landscapes and human lands. Greenland was populated

relatively late, 4,500 years ago, and has also been completely uninhabited for periods. The influx of people to Iceland happened so late that there is a written history of the island's first inhabitants. But human diffusion has had several front lines, and they have moved, with known settlements 8,000–12,000 years old in Siberia, Canada, and Scandinavia. Research on these matters is in a phase of such rapid development, not only technical but also climatic, that the picture should be seen as a progress report.

At many places in the Arctic, new archaeological finds are being turned up almost daily as a result of the melting of the ice. In the mountain world, traces of very early hunting of wild reindeer have been found. In Siberia some people now earn a living collecting and selling mammoth bones, extracted from the thawing tundra, a prohibited trophy but one that is in great demand. Some argue that bones which rise to the surface should be left in peace, even by archaeologists. In an area on the Yamal peninsula, the indigenous people interpret them as confirmation that some animals have moved their migration paths further down, into the underground which is safe from hunters (Anderson, Milek & Harrault 2017).

Local knowledge of which mountains and which valleys should be avoided suggests that people in the Arctic have shared experiences of living side by side with things that should be left in peace. The experience of living on an edge, close to challenging landscapes and to life forms and beings that are beyond the human, is also expressed in memoirs and legends. The agriculturally useless lava fields in Iceland are still sometimes described as the home of “the hidden people,” who only occasionally pass through the human world. The view of the polar area as a world beyond what is humanly possible has played a different role in the imagination of the outside world.

In polar travellers' narratives, the compass needle trembles as it points towards the north, not only towards the Pole Star, but unmistakably in the direction of what is seen as nature and challenge, danger and allure beyond and outside their known world. During the so-called pioneering era of European and American polar expeditions, the rhetoric was characterized by nationalist and masculine-coded heroism. The attractiveness of that kind of challenge sometimes seems to have been so extraordinary that it was described as morbid, and one could speak of young men afflicted by “Arctic fever.” Walter Wellman argued in 1898 that the only cure was to “put them on ice.” Travelogues from early expeditions to Greenland are also discussed in the article by Kirsten Hastrup.



Fig. 3. “Kornerup on the Ice.” Oil painting by J.E.C. Rasmussen from around 1890. Collections of Nuuk Art Museum. Photo: Tomasz Wacko, Nuuk Art Museum.

While male explorers of the Arctic were depicted as engaging in battles with the elements (and with rival expeditions from elsewhere), the women in the stories of the time emerge either as other distant objects of their longing or as clairvoyant mediums, with a supernatural ability to suffer vicariously the plight of the men in danger (McCorristine 2016: 149–164). The connection to spirituality is still found in contemporary writers, as when Annie Dillard (2015: 16) locates her meditative longing for an absent god at what she calls “the pole of relative inaccessibility:” the imagined point in the Arctic Ocean which is furthest away from land in all directions. From late nineteenth-century artists’ polar depictions, where scientists are portrayed as small and vulnerable on the edge of bottomless channels in the ice, to Bea Uusma’s (2013: 19) journey in the footsteps of Andrée’s balloon expedition, we sense the same call of the sublime—and the same obsessive will to know:

I have to try to follow them. I have to get inside their pockets. I have to get behind the words in their crumbling diaries. I have to understand what happens to a human being who is in the middle of the pack ice, unable to get away. I have to get into the ice, under the frozen snow. I have to get to the place where they died. I have to get to White Island.⁶

When she finally did get there, Uusma suddenly realized that she was at a latitude equivalent to something “underneath the round plastic disc at the top, the one you have to unscrew to change the light bulb:” an area sometimes considered too peripheral even to map (Uusma 2013: 102).

Although the Arctic today is relocated at the centre of global attention and concern, it is still difficult to pin down. Where is the start and finish of an area that (unlike Antarctica at the South Pole) does not count as a separate continent? There is no established and generally recognized southern border. Although the Arctic Circle has often filled this function, researchers in different sciences have instead seized on observable and more fluctuating factors. Meteorologists refer to average temperatures of ten degrees in July and botanists to the tree line, while linguists and cultural scholars are interested in phenomena that accompany people and are therefore more difficult to demarcate.

Anyone who is on the road between Luleå and Jokkmokk can, thanks to the Swedish Road Administration, take an extra turn with the car on a small road where you pass the Arctic Circle. But despite this kind of confirmatory pirouette, borders today are becoming increasingly blurred. As a result of global warming, the tree line has in some places moved over a hundred metres higher up. At the same time, the word Arctic is used as an epithet—a marker of interest, a brand, an identity—in more and more contexts far south of the Arctic Circle. Sweden is a member of the Arctic Council along with seven other states and organizations representing a much larger number of indigenous peoples from the circumpolar region. As discussed by Annika E. Nilsson in her article the growing number of observers illustrate that more and more countries have interests in the Arctic Ocean.

The tenacious dream of the Arctic as a destination for individual entrepreneurs from the south has also, at least since the growing markets and the whaling industry of the seventeenth century, been an operational part of the northern expansion of the nation states. The way the Arctic has been regarded as an accessible resource landscape, not only for groups that have slowly developed ways of living there but also for more industrial large-scale projects, is treated in depth by the historian Dag Avango in his contribution to this themed issue. In light of this, the heroic stories of expeditions to frozen expanses also appear as brushstrokes when the Arctic is painted as “almost uninhabited” and a

terra incognita to be explored and conquered (cf. Jonsson 2010: 106–109). One can see present-day parallels in the former US President Donald Trump’s proposal to buy (!) Greenland from Denmark. Also when local activism the other year helped to stop the international company Beowulf Mining from starting operations in Sápmi, both the threat of exploitation and resistance to it stand out as recognizable focal points in a postcolonial situation that is becoming increasingly global.

While the far north today is understood by new players and in new ways, the image persists of the Arctic as an ultimate limit. Arctic fever is flaring up again but mixed with the cultural diagnosis of our time: the growing climate anxiety. Nowhere on earth is global warming happening as fast today as in the northernmost region; melting ice and thawing permafrost appear to be rising barometer needles indicating the threatening state of the world.⁷ In many cases the situation is acute for both humans and other animals. But it is not only biotopes, but also long-since intertwined systems of nature and culture that are in accelerating processes of change. What was once portrayed as almost invincible is now associated with vulnerability. The situation is one of urgency for the four million people living in Arctic areas, but it may ultimately affect many more. The northernmost area on earth once again reminds us that humanity too has a limit.

The Tentacular Museum

The great challenge of our time, as the influential ecocritical thinker and theorist of science Donna Haraway (2016: 3–4) puts it, is “to stay with the trouble,” to dare to take in the scale and problems of climate change without giving up or indulging in excessive optimism about the potential of technology. In this situation, she advocates more unconventional cooperation in the creation of knowledge and in the presentation of the problem. Both theories and stories are needed, and this also requires a new openness for unexpected alliances. One of Haraway’s (2016: 2) examples is the relationship between scientific research and the bold speculation that characterizes science fiction. But what other border-crossing cooperation can pave the way for insights and work on shared problems? Can awareness of the fundamental uncertainties of our time make us more inclined to accept differences in the way knowledge is generated?

In places other than Nuuk public expressions are also created as comments on the effects of climate change. In Iceland in August 2019, the country’s president attached a plaque at the Ok volcano in memory of Okjökull, the first Icelandic glacier to be pronounced dead due to global warming: “This monument is to acknowledge that we know what is happening and what needs to be done. Only you know if we did it.” The new memorials are emerging in a borderland between art, activism, and storytelling and, like the old myths, they span very long distances in time and space. These are poetic and political responses to a crisis that is at once geologically, culturally and existentially mindboggling.

Some examples of new forms of collaboration on climate research can be found closer at hand, in the northern Swedish mountains. The lands where the young Linnaeus thought he saw “God himself on his back”—and where humans and animals have created paths for thousands of years—are among the areas where global warming is known to be happening so fast that the consequences are already staring us in the face. The geographers at the Tarfala research station, Stockholm University, where glaciers have been measured and studied since the 1940s, are working today both with artists such as Hanna Ljungh and with the local and hard-pressed reindeer herding of the nearby Sami village of Laevas. Like eighteenth-century naturalists, today’s botanists collect observations with the help of mountain hikers. For example, there is citizens’ research on shifts in the

cycles of mountain flora.⁸ As in the current pandemic (2020), both old and new paths are activated by a creativity and openness that seems to grow in times of crisis.

The *Anthropocene*, above all, as Sverker Sörlin (2018: 174) writes in his book with that concept as its title, reflects that we are at once irrevocably at the end of something old and at the beginning of something new: “a time when man’s responsibility for creation must be formulated on a new level.” The designation signals that our time is characterized by the way human activities have affected the earth’s climate and ecosystems, and it has also had a major impact on artists and humanists. The environmental historian Jason W. Moore (2016) is among the critics of the term. He does not question the idea of a new era, but that the term—meaning “the age of mankind”—tars all humans with the same guilt for the consequences of historically specific power orders and economic systems. Shouldn’t it rather be called the *Capitalocene*? Donna Haraway’s (2016: 31–33) alternative term *Chthulucene* points instead to the need for new approaches in a new era. The name refers to something unexpected in this context, a small spider, *Pimosa chthulhu*, which lives in old stumps of California’s huge sequoia tree, which it takes apart and weaves into something new. With its eight legs, it can work in several directions at the same time and connect what was previously unconnected in a web of thin but strong threads. That Haraway takes an animal as a teacher is not a coincidence; it underlines that mankind should drop the claim to stand above other species. We are not alone in trying to deal with the earth’s accelerating problems.

When interpreted literally, the *tentacular* image may feel alien, but it captures important aspects of the methodology of unconventional cooperation. The word *tentacle*, Haraway (2016: 31) reminds us, comes from the Latin *tentaculum*, deriving from a verb with the double meaning of ‘to try’ and ‘to feel.’ As a methodological model for a project that integrates multidisciplinary research with the museum’s exhibition work and documentation from different places and projects, which are in turn characterized by local collaboration, the image is inspiring. The tentacular spinning creates threads in different directions which are connected in a web that can span borders and cracks.

This themed issue forms a vital node in the large web of voices, collections and perspectives woven to secure a multidisciplinary knowledge base for a major exhibition on life and climate change in the Arctic which opened at Nordiska museet in Stockholm in October 2019. “The Arctic—While the Ice Is Melting” was preceded by several years of boundary-crossing work. It was an early choice not to dwell on well-known polar expeditions in the exhibition, but instead to highlight the Arctic as home for the four million people who today live and work there. Well aware that this initiative was also taken outside the Arctic, we hoped to include other voices and perspectives from both present and past.

The five articles in this issue—all peer reviewed in collaboration with the *Journal of Northern Studies*—form the spine and base of the illustrated volume *Arktiska spår* [‘Arctic traces’] (2020), which also features forty shorter contributions from scholars, artists and curators and serves as a catalogue *raisonné* for the exhibition. Like the exhibition itself, the hybrid book genre was a method for linking the academy’s and the museum’s work of presentation and research in a collective and border-transcending effort to expand knowledge, focusing on the changing Arctic. The collaborative process began in the autumn of 2016 and involved conversations and seminars, open lectures and film documentation in Arctic local communities and research stations. Apart from the research dialogues, which often crossed disciplinary borders in an unusual way, there were also ongoing inventories of artefacts and archival material, discussions in the reference

group, and finally the cooperation with artists, producers, and craftsmen leading to the concrete construction work in the museum's galleries. Nordiska museet was in charge of the production but more than forty scholars in both the social and natural sciences, as well as other kinds of experts, generously shared their research and advice throughout the curatorial process.⁹

All of the authors in this themed issue have participated with presentations at Nordiska museet, either in the series of open lectures "Arktiska spår" or in the invited Hallwyl seminar series on geo-cultural changes in the Arctic, which I led, in the role of Hallwyl Visiting Professor at Stockholm University and Nordiska museet and which ran for three terms (2017–2018) and brought invited researchers from different faculties together with interested artists and the museum's own experts in collections and archives. For the dialogue between scholarly traditions, it has been important that a museum served as a platform for conversations and presentations. Anyone who tries to make their research understood in contexts outside their own discipline is in some sense always outside their comfort zone. That has been a shared experience here, which has stimulated mutual curiosity and created new dialogues between researchers and new opportunities for communication.

Apart from program activities, lectures and articles, Dag Avango and Annika E. Nilsson have also contributed texts, constructive criticism, and expertise in the reference group. The specimens in the exhibition of older works of art and utility objects from different parts of the Arctic area are characterized by ingenuity and concern for function, resource management, and beauty. It has been a conscious decision not to show them isolated from contemporary voices and various aspects of tradition and modernity. A number of documentary films, produced by Nordiska museet and the Norwegian filmmaker Camilla Andersen, in collaboration with local communities and ongoing research projects, provide additional testimony from contemporary everyday life and work in the Arctic. The film from Nautanen, one of the many places in the Arctic where a bust has left haunting presences and abandoned traces of extensive resource extraction, was made in cooperation with Dag Avango. Kirsten Hastrup and Kyrre Kverndokk also gave inspiring open lectures at Stockholm University during their visits.

The seminars covered a wide range of topics but were united by a couple of overall questions. How can we together arrive at a better understanding of geo-cultural processes of change that also have existential dimensions? And how should we translate our own pre-understanding and go beyond it, in ways that engage more people? Here, clearly, no perspective could act as the lone "hero" on the ice. Rather than searching for shared definitions or unambiguous boundaries, a space was created for complementary understandings, scales, and knowledge goals.

On a few occasions the multidisciplinary talks were scaled up to public events, where we also showed finds which had resulted from the targeted search of the collections that was being carried out parallel to the seminars. In addition to the museum's knowledge builders, the seminars were also attended by invited authors, scientists, humanists, and other experts. As stressed by Annika E. Nilsson in her article, there is a need for more ways for researchers from different faculties to meet, but also for research and local and practical knowledge to interact more. A reindeer herder testified about daily life in transformation. A foreign correspondent supplied current impressions from Siberia.¹⁰

The lived experience in a local environment can be at least as real and relevant for ensuring continuity as the explanations offered by scientific models. At the same time, there is reason to dwell on the insight that local perspectives are not automatically com-

patible with each other or with understandings that encompass a global perspective. As Tim Ingold (2014: 235) has put it, the step towards humbler collaboration is to acknowledge and accept that there are cracks between different but equally valid descriptions of reality. Allowing more narratives to be heard, with no demand for unanimity, is an attempt to avoid “the danger of a single story,” to borrow an expression from Chimamanda Ngozi Adichie (2009).

The research articles are all generous contributions to a joint effort to heighten public awareness of the situation in the Arctic and its complexities. In spite of the obvious distance between their disciplinary points of entry to this field, they are placed in a kind of internal dialogue, where Hastrup and Jakobsson—who both build on extensive fieldwork in the high Arctic from differing angles—expand our understanding of the dynamics of ice. Jakobsson reaches into the depth of oceans and deep time, while Hastrup details the ruptures and continuities of Inuit relations with the frozen yet fertile hunting grounds for sea mammals, historically and with an eye on the immediate and growing crises.

Both Dag Avango and Annika E. Nilsson revolve around the critical concept of resource landscape, while looking in somewhat opposite directions. Avango offers a historical understanding of the uses and perceptions of the Arctic from explorers and exploiters of the south, while Nilsson allows her survey of climate research to stretch into ideas about the future, and the factors that combined might strengthen societal resilience.

The encounters between such differing perspectives and scales as those of geology, history, social sciences, and ethnography are contextualized in the essay on climate change where Kyrre Kverndokk takes the clash between temporalities as point of departure for a meta-perspective on climate change, as it affects media and everyday understandings.

Tracks and Traces in Knowledge Production

A key argument in the edited volume *Curating the Future. Museums, Communities and Climate Change* (Newell, Robin & Wehner [eds.] 2017: 4–6) is that museums, as safe places for meetings between people and collections, have a special potential to arouse engagement by conveying both knowledge and emotions. As a counterweight to the format and publishing logic of the news media, the museum offers other scales and experiences of time. Here, according to the editors, all of whom work in the borderland between academia and museums, one can experience a global change at a rate that is human. Perhaps, they go on to say, we need slow media like this to be able at all to absorb and understand the kind of change that has also been called “slow violence,” which in many other situations can be perceived as contrary to the direction and demarcation of personal experience. Objects and images are crucial elements for the museum medium. They are the paths through which stories can flow (Newell, Robin & Wehner [eds.] 2017: 2).

It has been possible to draw material from Nordiska museet’s collections into the gravitational field of multidisciplinary dialogues, both in the preparatory work for the exhibition and later, as part of the presentation. A shield against snow-blindness, made of sooted glass and birch bark. A worn wooden kneepad to enable people to work longer on the ice, with long notches made by someone cutting fish or meat on it. Notes in the archive showed that the sock-knitting needles, acquired from Hestur in the Faroe Islands, were manufactured there from driftwood that had floated ashore (see Fig. 4). Recorded data and artefacts are not only contributions to the growth of knowledge resulting from the project. They have also been catalysts and trace elements for emotions. This can be anything from a story of personal experience about how to protect an infant from the

cold and wind during the migration with the reindeer, to the encounter with a small, worn, but beautifully decorated knife used for peeling bark from trees. Even through a showcase, the encounter with an everyday object can make it possible for more people to identify with and learn from previous generations' knowledge and experience. For a researcher, a subjectively affecting trace, a visual or material *punctum*, to use Roland Barthes' (2006; Gustafsson Reinius 2008: 23–44) terms, can often give powerful stimuli for further tracking.



Fig. 4. Objects from the sea and the Faroe Islands. Collections of Nordiska museet. Photo: Karolina Kristensson, NM 0094083.

Working with fragments that may seem insignificant, but which when exposed and studied in more detail reveal wider connections, is a method that many sciences have in common (cf. Ginzburg 1989). The words *trace* and *tracing* in the title of this collection of articles allude to one of the overall metaphors that enabled the tentacular work. The search for knowledge, expressions, and understanding has taken place through traces in the multiple sense of imprints, remains, trails, and concrete movements. A poem says that “the paths are wiser than we are, / and know all we wanted to know.”¹¹ A trampled path is an imprint of past movements and a trace that conveys knowledge. It can simultaneously connect us with what has been and propel us forward in motion. The walker meets condensed experience and contributes through his or her own imprint to increase it and pass it on. Perhaps this has a particular resonance in the northern parts of the world? Trails and paths are part of the heritage of movement in the northern mountain world (Svensson, Sörlin & Wormbs 2016: 131–151), but they are also crossed by newer road networks. Many who live around and north of the Arctic Circle live in the cities or commute to them. There are nurses and miners, schoolchildren and teachers, but also hunters and reindeer herders whose language, culture, and livelihood have been shaped by millennia of participation and interaction with the ecological context of the frozen

tundra, the Arctic Ocean, and the forests. It has often been a question of following mobile resources such as reindeer, fish, or other prey. Many still live with some form of seasonal migration, but even more often follow in the wake of an essentially different kind of movement; the more or less forced migrations of people, caused by the changing territories of the nation states or by resource extraction, have become a shared and often very painful Arctic experience.

As a cultural heritage scholar with an interest in rituals and materiality, I myself proceeded in my initial example from monuments, graffiti, and wreaths as material traces of historical relationships and their renegotiation in the present. The marine geologist Martin Jakobsson reads a planetary history that is many millions of years old in the sediment at the bottom of the Arctic Sea while a historian like Dag Avango finds sources in both the written documents and the concrete imprints of things like mines and abandoned ghost towns. The flows that reveal the links between movements of the landscape and people's way of life include not only the melting of the ice but also the movements of driftwood with the ocean currents. Both, as analysed by Kirsten Hastrup, are deeply entangled in the currents of ideas and technologies that depend on a certain materiality. The interrelation of the development of the infrastructure with the expansion of tourism and industry is pointed out by Dag Avango, while Annika E. Nilsson introduces the theme of social movements in her reasoning about humans as another kind of resources.

Another productive and related picture of how knowledge is made is the idea of *archives* as media where what has been preserved for a long time can also rise to the surface and make something clear. As we have seen, the two poles have been a symbol of all that is peripheral and remote, but also of a form of stability, given by nature, and in some sense beyond history and change. It is as if frozen ice sheets at both ends of the globe have kept the world in place, both conceptually and as cooling matter. When permafrost thaws and icebergs melt, such—simplified—dichotomies of nature and culture, time, space, and different identities are also disturbed. Kyrre Kverndokk discusses in detail how the climate crisis, and not least the fact that ancient ice is melting, affects the understanding of time in research, in the media, and in everyday life.

In his book *Returns. Becoming Indigenous in the Twenty-first Century*, the anthropologist James Clifford (2013) pronounces dead the grand ethnographic narratives about the “extinction of primitive peoples.” What has happened, he says, is instead that the Western world is starting to be decentred, indeed, to the point that the postcolonial self-criticism to which the cultural sciences have devoted so much energy is already outdated. In the huge number of examples of how representatives of indigenous peoples in different parts of the world are reconquering language and other kind of global and local agency today, it is tempting to mention also the artistic energy that is working with the Sami experience in Scandinavia today.

It would be liberating to be able to join in proclaiming that the theory of cultural disappearance is disproved and dead and can finally be consigned to the hall of shame for colonial rhetoric. But perhaps that would be simplistic? In the north, too, many indigenous peoples share a heavy history of colonial experiences, which have harmed language, culture, and self-determination. What is happening as a result of climate change is so culturally transformative in many places that it would be cynical not to recognize it as an acute and global problem. However, it should be done with a large portion of humility. The question of the future and history, the actual narrative of what is happening, should be neither idealized nor formulated in unequivocally negative terms.

Metaphor, Hope, and Other Crucial Methods

The museologist and historian of ideas Mattias Bäckström (2016: 10) has argued that exhibition productions can also be understood as a special form of research process. He is particularly opposed to a simplified division into the knowledge content on the one hand and the physical form in which it “communicated” on the other. What Bäckström describes as a “double-sided interlacing practice” of representational and multidisciplinary reflection is a mutual process. Because the conversations about these processes were held in a museum of cultural history—and not in a more scientific environment as might be expected—they acquired a figurative meaning. From the museum’s multidisciplinary “laboratory,” the tentacles extended to artefact stores, archives, and card indexes. Here too, the project initiated a form of opening that uncovered traces and layers of previous efforts to order, categorize, and draw boundaries. In this project, of course, the elements of art and design in the exhibition have also been stimulating for the reflection and interpretation. The literary scholar Rita Felski (2015: 52) comments on the recent academic upswing for metaphors, saying that they represent something that is both risky and necessary, images of ideas based on fundamentally analogue and comparative thinking. It is also useful to think with Paul Ricoeur’s ([1986] 2003) classic observation that metaphors create new knowledge through a process of semantic creativity that adds an understanding of feeling and sensation. The metaphor, like the exhibition, thus also has a kind of tentacular agency.

The mutual enrichment arising from collaboration between academia and museums has to do with specialization: in the university, theories and concepts are developed in critical discussion; in the museum there are the tools to give form and space to metaphors and voices. When theoretical concepts and ideas, such as the model of connectivity between different factors that may support sustainability as discussed by Annika E. Nilsson in her article, were translated into the artful expressivity of exhibition language, the role of concrete action also materialized in new ways.

Throughout the industrialized world, albeit especially in rich parts of the northern hemisphere, we are all entangled in the problems that threaten us and future generations. We need to find a way of living with the realization that we ourselves are simultaneously threatened and part of the threat. Crises can be perceived as a form of broken contract, but also as growing rifts between societies, groups, and individuals, between species that have long been interdependent and perhaps also—when the very seasons and the foundations of existence are slowly changing—as a break in the relationship between mankind and being, mankind and God. During the so-called Little Ice Age it happened that people who had formerly believed in the pagan Norse gods, the *Æsir*, in despair and anger desecrated images of the gods who no longer seemed to accept their sacrifices or deliver gifts in return, in the form of summer and the returning sun (Andersson 2011). The rift that runs between generations, species, and communities is also cracking open within us. In the title of her article Nilsson builds on this image, suggesting that we perhaps should view the ruptures as openings, in that a growing awareness of crisis will force us to find solutions.

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In her article “Living (with) Ice,” the anthropologist Kirsten Hastrup takes us straight into the heart of the project’s overall theme—the relationship between mankind and climate in the Arctic—with an empirical focus on the northernmost known settlement on earth, the Thule region in High Arctic Greenland. The survey begins with the arrival of the first humans some 12,000 years ago and leads on to the era of European expedi-



Fig. 5. Entrance to the exhibition “The Arctic—While the Ice Is Melting,” designed by Museea (with Sofia Hedman and Serge Martynov), Nordiska museet 2019. Photo: Hendrik Zeitler.

tions and Hastrup’s own ethnographic fieldwork, with recurring encounters and learning situations with today’s Inuit. Descendants of the ethnic group that Rasmussen called the *Thule people* very consciously call themselves *Inughuit* today and live with accelerating changes to their climate and their lives. These processes are captured in Hastrup’s term *geo-sociality*, i.e. people’s interaction with the ice that constitutes “a constantly moving life force” with an effect on everything in the area, from food supply to poetics.

The marine geologist Martin Jakobsson has devoted much of his research to mapping and sampling the Lomonosov Ridge, which runs across the bed of the Arctic Sea in a way that Jakobsson’s scientifically led polar expeditions have helped to (re)locate. Based on the idea of the seabed sediments as a natural archive, he takes us on a research journey with veritable deep dives into time and the sea. With such a long perspective, climate, just like earth, water and ice, is revealed to be a fundamentally changing and moving phenomenon. In this volume the scientific angle—also through its clear account of the ways in which such knowledge is produced—is a vertiginous approach to the discussions of the Anthropocene and mankind that Jakobsson also touches on but which is further developed by Kyrre Kverndokk.

In his article Kverndokk, who is himself the leader of a multidisciplinary project,

“The Future is Now,” on climate crisis and understandings of time, applies cultural analysis to contemporary processes of change, with a focus on how everyday life and media discourses are characterized by a growing crisis awareness. He discusses and exemplifies how concepts such as the *Anthropocene*, *acceleration*, and what he calls *family time* move into everyday life and into the often-politicized discourses of science and the media. Inspired by, among other things, the philosophy of time and ethnological cultural analysis of traditional, more cyclical and ritualized understandings of work and seasons, he discusses the new temporalities of the climate crisis. In his essay he emphasizes that the changes affect us culturally and existentially. In the rift between an increasingly impossible modernity and an intimidating future, people alive today find themselves in a shared experience of what the ancient Greeks called *kairos*: the time of the isolated and decisive moment.

Dag Avango discusses in his text how the circumpolar areas have been regarded and used as resource landscapes by economic and state interests. Paths and cracks of industrial history run through this exposé of the mining industry that has been established—and de-established in times of *bust*. With an empirical focus on northern Scandinavia and Greenland, the author outlines the complexity that characterizes the history of colonization in the Nordic Arctic region. The basic theoretical perspective comes from the ideas about sociotechnical relations and the analysis moves towards issues of resource management and sustainability today and in the future.

Annika E. Nilsson has worked as both a social scientist and as a science journalist. In her article she reasons about climate research while also arguing that people themselves are central resources in dealing with the man-made crisis. Nilsson surveys how climate researchers work with scenarios and geo-social analysis, but also looks to the future, discussing human resources and possibilities to bridge the local and the global.

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Converging around the earth’s northernmost areas are several of the grand narratives of nature and mankind, each of them carrying its own meaning, power, and morality. Man, woman, the indigenous peoples or a guilt-ridden and expanding humanity—here the narratives change both subject and object. Today, research perspectives and public media alike are in the process of opening for new movements and new voices. No science—and no generation—alone can lay claim to something as mythical and controversial as the narrative of the Arctic areas which are in rapid motion today and are being thoroughly recharged.

When it comes to the Arctic—and no doubt other parts of the world too—questions of hope also contain a conflict of interest. How do we avoid romanticizing and sweeping problems under the carpet in the talk of the indomitable ability to adapt? How do we describe what is happening without getting caught up in either panic or denial? On one point it was insisted that we had to be particularly clear in the exhibition: global warming is not an untested hypothesis or a matter of outlook. Maintaining a firm stance against alternative truths must be included in a pluralistic ambition.

As for hope, the anthropologist Hirokazu Miyazaki (2004) has stressed that the ability to recreate it over and over again is crucial in different kinds of knowledge processes. His inspiration for this came in an ethnographic study of a group in Fiji who spent years searching the archives in a stubborn hope of finding valid documents, while simultaneously recreating their optimism in various ritual ways. In that light, hope no longer appeared to him to be a cultural phenomenon to study but a method in his own quest for

knowledge. Every research question and outlined study is based on—and at the same time a way to arouse—optimism about something being possible to understand better. At best, this encounter between voices and perspectives conveys something similar.

ACKNOWLEDGEMENTS

As mentioned, this special issue *Tracing the Arctic; Arctic Traces*, features research articles that also form the spine of a catalogue *raisonné*, *Arktiska spår. Natur och kultur i rörelse* published by the Nordiska museet to offer the visitors of a major exhibition, “The Arctic—While the Ice Is Melting,” a multifaceted and deeper understanding of the ongoing changes in the circumpolar region. While the final editing is a collaboration with the journal’s editor, prior efforts and work of the editorial group at the Nordiska museet should also be recognized. Warm thanks to Anders Carlsson, Marie Tornehave, Karolina Kristensson and Flora Bartlett. A translation from Norwegian to Swedish was at a former stage offered by Barbro Blehr. Alan Crozier has—once more—done a terrific job in translating some of the texts from Swedish to English and in double-checking the language.

NOTES

- ¹ This article is a revised and translated version of the chapter “Arktiska spår. Om vägar och vävar över sprickorna” [‘Arctic traces. On ways and weaves over the crevasses’] in Gustafsson Reinius (ed.) (2020), pp. 16–37.
- ² The statues are casts in bronze of works by the Danish sculptor August Saabye. The monument at the Marble Church was erected in 1913.
- ³ “Hans Egede. Greenland votes on colonial danish statue,” *BBC News* (16 July 2020); www.bbc.com/news/world-europe-53429950; access date 15 Dec. 2020.
- ⁴ The statue is the work of the artist Christian Rosing.
- ⁵ The myth is based on oral tradition but has also been disseminated through being recorded by Rasmussen, where the advisor of the sea is called *Ímap ukúa*.
- ⁶ The quotation is translated by Alan Crozier from the Swedish original: *Jag måste försöka följa dem. Jag måste in i deras innerfickor. Jag måste in bakom orden i deras söndervittrade dagbokssidor. Jag måste förstå vad som händer med en människa som befinner sig mitt i packisen, utan att kunna ta sig därifrån. Jag måste in i isen, under skaren. Jag måste till platsen där de dog. Jag måste till Vitön.*
- ⁷ A source as reliable as the annual report of data approved by the IPCC, the UN Intergovernmental Panel on Climate Change, speaks of an average increase in temperature of five degrees a year, compared to the two degrees it expects globally (see www.ipcc.ch/srocc/; access date 28 Dec. 2020).
- ⁸ www.slu.se/ew-nyheter/2018/2/medborgarforskningsplattform/; access date 15 April 2020.
- ⁹ More detailed acknowledgements at the homepage of Nordiska museet: www.nordiskamuseet.se/en/articles/thanks.
- ¹⁰ This particular conversation can still be found on Stockholm University’s website.
- ¹¹ “Balladen om stigarna i Västmanland” [‘The ballad of the paths in Västmanland’] by Lars Gustafsson, is in his *Artesiska brunnar cartesianska drömmar. Tjugotvå lärodikter* (2016).

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KIRSTEN HASTRUP

Living (with) Ice

Geo-sociality in the High Arctic

ABSTRACT The main tenet of this article is to show how the ice, so visually dominant in the High Arctic, is also a prominent life force. The ice is never still and as it moves, melts or freeze, it deeply affects human and animal life in the region; conversely the diverse life-forms affect the icy environment in their own way and tempo. This interplay exposes the geo-social relations at the centre of this article, taking off from the gradual retraction of the ice after the last Ice Age, opening up for human movement and settlement in High Arctic America and eventually in Thule (Avanersuaq), in Northwest Greenland. Today some 750 people live there as hunters in the unsurpassable old hunting style, yet also as modern as anybody when it comes to outlook. Through brief discussions of particular periods, from the “discovery” of the Inughuit in 1819 and until the present, it is shown how deeply their life is implicated in the living ice, for better and for worse. The ice emerges as a refrain that holds the landscape together. The argument is based both in historical research and in regular anthropological fieldwork in the region over ten years 2007–2017.

KEYWORDS Thule, Inughuit, geosociality, ice age, discovery, Cold War, hunting, seasonality, climate change, unsettlement

The High Arctic region is often perceived as a world of stillness, its deep-frozen landscape more or less barring life.¹ Even in the Nordic countries bordering on and incorporating parts of the Arctic, the far North has mostly been seen as an “other” landscape or a particular kind of wilderness, not least due to the forceful presence of the ice. At closer inspection, the ice is not still, nor does it prevent life. It is a constantly moving life force, shaping and reshaping the region—and making or unmaking spaces for other kinds of life in the process. This includes human life, living off the natural species that are found by glaciers, sea ice, icebergs, and inland ice formations. Here we shall approach the mutual influence of ice and life in the Arctic by unpacking shifting geo-social relations, beginning with the first human arrival in the region in the wake of the gradual retreat of the last Ice Age some 12,000 years ago and continuing until this day. Geo-sociality refers to the entanglement of geological and social processes, so conspicuous in the Arctic (Pálsson & Swanson 2016). In the present context, the history of the Arctic world begins with the arrival of humans, setting the scene for geo-social relations.

The ice has largely defined both natural and social histories in the region, not necessarily in step with each other, but always in dialogue; this is what makes me suggest that the ice itself is a life force. In High Arctic latitudes, there is no way to think of social and natural spaces as actually separate, both are formatted by the ice, including the perpetual permafrost in the landscape, responding to each other’s changes—if not always synchronized. Depending on where one is in the region, the ice may be a more or less forceful

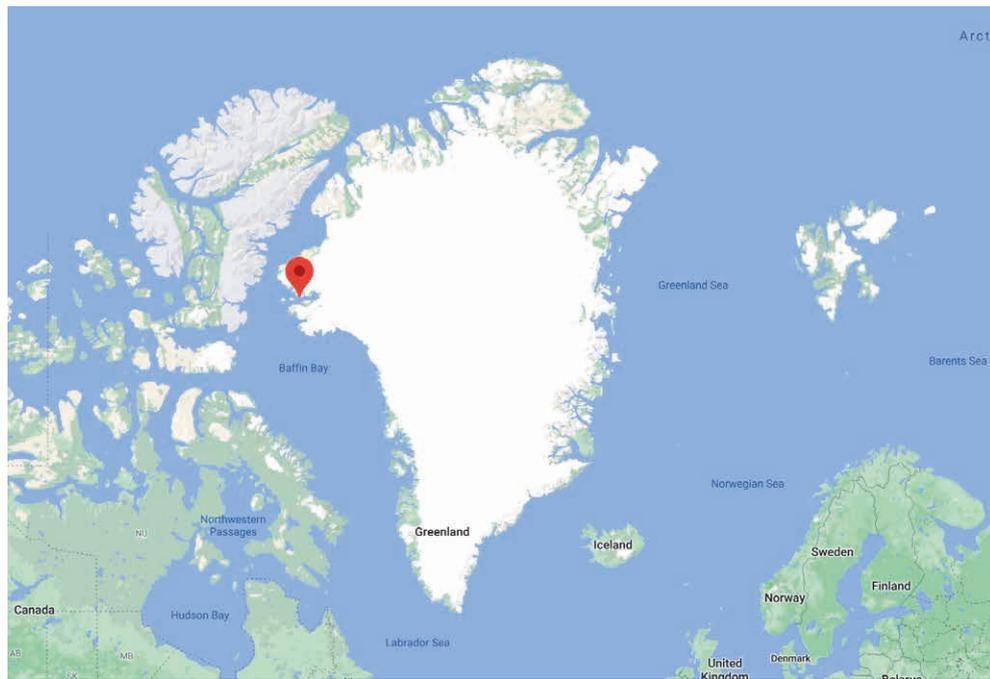
presence in the field of vision, but it is always on the horizon. It impinges upon the imagination, it creates social dramas, and it affords a wildlife on which people subsist, while not leaving much space for vegetation. This is what makes it possible to see the ice as an agent in its own right, and even as an argument in human history (Hastrup 2013). As such it has widely infiltrated representations of the Arctic and become a focal point in a multiplicity of histories and theories about the environment.

This chapter draws strength from anthropological fieldwork in High Arctic Greenland over the past ten years (2007–2017), in a region that is known by the name of Avanersuaq [‘the Big North’] within Greenland, while mostly known by outsiders as the Thule Region. The latter name is owed to Knud Rasmussen, a renowned Danish polar explorer, who adopted it from classical Greek notions of *Ultima Thule* emerging out of the mists on the North Atlantic, and widely recycled also in medieval Europe (Hastrup 2007). Thus Thule was temporarily located in Iceland once this island was discovered in the ninth century, yet it found its lasting place only in early twentieth century through the name of the trade station set up by Rasmussen and others in Northwest Greenland in 1910. Naming carries its own geo-social history, often precipitated by scholarship and exploration, and always referring to both concrete and imaginative horizons (Hastrup 2015).

Today, some 750 people have their home in the Thule Region, most calling themselves *Inughuit*, a distinct group of Inuit, but still known also as the *Thule people*. The district is vast and extremely isolated when seen from the south, which is virtually everywhere else seen from Thule. It is the northernmost (natural) habitation on the globe, and it was no coincidence that Robert Peary selected this place as the last and most important stepping stone towards the North Pole, which he “conquered” only because the hunters agreed to help him navigate the ice (Peary 1910). In Thule, living *with* the ice is no metaphor, but reflects a direct and very conspicuous relationship between the shifting materialities of the ice and the itinerant social life. The horizon changes by the year, it now seems, the traditional seasons for hunting and moving about being out of tune with the actual weather conditions, and leaving the animal resources increasingly confused, as the hunters see it. To deal with the tangled relations between ice and life, the notion of geo-sociality offers an analytical perspective that is applicable on multiple scales from the intimate to the planetary, fitting life in the Arctic so well.

Beginnings. The Ice Age

The story of Arctic geo-sociality begins at the end of the last Ice Age, some 12,000 years ago, in the general region of what was later to become known as the Bering Strait. At this latitude, the ice had bound up the water between the two continents, enabling people to walk over from Asia and to begin colonizing the Americas by way of Beringia, as the dry pathway was later to be dubbed. With the gradual retraction of the ice covering North America, people eventually also moved eastwards along the coast and further into Greenland, crossing the narrow strait between Northeast Canada (Ellesmere Island) and Northwest Greenland (Thule). The first arrivals in Greenland took place some 4,500 years ago. Later waves of immigration occurred in between periods with no trace of humans in Greenland at all (Gulløv [ed.] 2004). The last migration into Greenland took place c. 1250 CE. The immigrants—retrospectively named Inuit and cast as ancestors of modern Inuit populations in the Arctic—gradually (re-)populated all of Greenland. Thus, the geological fact of the Ice Age and its gradual retraction became a vehicle for human movement, and we have our first example of the social implications of the living ice—and of the agentive materiality of the ice itself (Bennett 2010).



Map 1. Thule/Qaanaaq, 77° N. Source: Google Maps.

Before the arrival of the Inuit, Norsemen from Iceland and beyond had settled in the southerly parts of Greenland from the tenth century onwards, and had even sailed further on to America. The mild temperatures and the felicitous winds of the Warm Medieval Period (c. 900–1250 CE), as it is known today, made it possible to cross the North Atlantic and settle in newfound lands, including Iceland (Hastrup 1985). The Inuit immigration into Northwest Greenland took place towards the end of this period, allowing a new people with new technologies such as big skinboats (*umiaks*), kayaks, and dog sledges to move rapidly from Alaska along the Arctic coast of the North American continent, and further into Northwest Greenland (Schlederman & McCullough 2003; McGhee 1997). From here they moved south along the western coast of Greenland. The Norsemen and the Inuit eventually met in the area of the present Disko Bay—the *Norðsettr* of the Icelandic sagas recording the meetings with the barbarians—where there were rich hunting grounds due to the highly productive surrounding glaciers (Hastrup 2009a). The most precious prey of the Norsemen was the walrus, whose tusks were a major trade item in Europe and beyond.

These lines of communication were broken when the global cooling, resulting in the Little Ice Age (c. 1350–1800), set in and complicated the passage in the North Atlantic. This eventually led to the demise of the Norsemen in Greenland, of whom the last was heard in 1405. In Iceland, the consequences were also dire, as the fragile northern agriculture became unfeasible and livestock deteriorated from lack of hay during the long, increasingly cold, wet, and snowy winters (Hastrup 1990). People suffered all the more, as connections with the Nordic countries became ever more tenuous on the now very windy and increasingly icy North Atlantic; the result was a dramatic population decline. In Greenland, the passage between North and South was blocked, leaving the Inuit in Thule to their own devices for some three centuries—out of contact with their relatives in more southerly parts of Greenland, until they were rediscovered and reconnected with

the outer world in the nineteenth century. Only then did the ice lose its absolute grip on the Arctic coast, and explorers from Europe and America gradually emerged from southern mists.

This was also the time when European scientists began understanding the Ice Age through empirical studies of the glaciers in the Alps and in Greenland, now suggested to be leftovers from then. In 1837, the Swiss scientist Louis Agassiz proposed a glacial theory, suggesting that the entire northern hemisphere had once been covered in ice, of which the Alpine glaciers were remnants. The glacial theory was not easily accepted, as it conflicted with the diluvial theory, explaining the conspicuous presence of huge boulders from elsewhere by a major flooding episode, possibly the Biblical flood in the Mosaic tradition (Rudwick 1969). Clearly, the travelling boulders were of a size that precluded human interference, and as they could be traced back to faraway sources in Scandinavia and elsewhere, a grand theory was needed. The diluvial theory made some sense, and the more so as it became gradually detached from the Biblical tradition, and was supported by prominent naturalists like Charles Lyell (Hansen 1970). This reminds us how recent the understanding of the powerful presence of the ice in the northern hemisphere is.

The glacial theory was to gain further momentum from studies of fossils and their living exemplars carried out by Swedish expeditions to Svalbard; the first was undertaken in 1861 under the leadership of Otto Torell, often seen as the father of Swedish glaciology (Liljequist 1993). Through such work, the Ice Age was identified retrospectively, if reluctantly, from empirical observations of the ice and of ancient fossils of particular species that were still living in the Arctic. This happened in the nineteenth century, at the pinnacle of polar exploration. The ice was recognized as a repository of climate histories in the depth of time. Fossils and other traces in the landscape from earlier ages emerged as strong mementos about the agency of the ice in the making of the entire history of the North (Sörlin 2002: 91–93).

In Greenland the first scientific investigation of the icecap was made by Hinrich Rink in the mid-nineteenth century. Rink was both an administrator of Danish interests in the region, and a scholar who contributed to new knowledge about the language and worldview of the Greenlanders and about the nature of the vast island. In both his work as a governor of South Greenland and as a scientific observer he enlisted Greenlanders as experts, citing them for their knowledge. This enabled him to publish a new understanding of both the icecap and the floating icebergs, concluding that glaciers were outlets from the icecap, under ever more pressure from each year's snow (Rink [1877] 1974: 39–55). He also identified the sub-glacial watercourses running under the ice, and he

[...] was informed by the natives that this had always been a well-known fact to them. They say that the more abundant the supply of water, and the more violent its motion is in the streams of fresh water which take the form of wells in the front part of the glacier abutting on the sea, the more effective will the glacier be in producing icebergs. (Rink [1877] 1974: 361)

Planetary science and local observations supported each other. This is one reason for pausing at Rink's work; another is his bearing witness to the profound knowledge of nature's stories, as entertained by local hunters who knew the ice-fiords to be productive also as hunting grounds.

Above, Knud Rasmussen was mentioned as the founder of the Thule trade station in 1910. He was also the leader of many Thule expeditions, so named because they were all partly financed by the surplus of the trade station (mainly gained on fox-skin), contribut-

ing vastly to new knowledge of both natural and human conditions in the region. Rasmussen embodied the growing interest in the nature of the Arctic and of its inhabitants (Hastrup 2010a). The second Thule Expedition, 1916–1918, being a broad cartographic and naturalist expedition along the northernmost coast of Greenland, took place when the Ice Age had become an established truth. The geologist Lauge Koch was a member of this expedition and he made important geo-morphological observations, which he passed on to Rasmussen who was thrilled to learn about the traces from a past time, when there had been no ice in region. Even today, the inhabitants of Thule sometimes find fossils from before the Ice Age, collecting them and exhibiting them on their windowsills. Koch, who knew about the geological periods, made the following note on the Ice Age, still present in the far North:

As will be known, almost all of North and Central Europe was covered by one continuous mass of ice, which arched up as a shield from Scandinavia and across the neighbouring countries. A similar case obtained for Canada and the northern parts of the United States. In Greenland, the ice has remained, one is still in the middle of the ice age, and to travel from South to North Greenland is to experience the return of the Ice Age. (Koch 1919: 565)

Koch then guides the reader up north and discusses the various landscapes in terms of their relative position in the history of an emerging ice age. Chapter by chapter we take new steps back in climate history, first experiencing the onset of the Ice Age, then the still firmer grip of the ice, until we reach it in fully blown form—in Thule of course, where the ice covers almost everything. In this way, ancient climate history was depicted in space.

Openings. The Thule People

The people actually living in the depth of the Ice Age in Thule became known to the outer world rather late, as we learned above, and they remained on the edge of vision until far more recently. The first to report on their existence was Captain John Ross, who had been sent out by the British admiralty to find the Northwest Passage in 1818. Having traversed the now less ice-packed Melville Bay, he met a small group of unknown people. Captain Ross, a Scotsman, was quite taken by these fur-clad savages, whom he affectionately referred to as Arctic Highlanders, an interesting analogy between the foreign and the familiar. He wrote:

The origin of the Arctic Highlanders, or inhabitants of Prince Regent's Bay, is a question as yet involved in peculiar obscurity. They exist in a corner of the world by far the most secluded which has yet been discovered, and have no knowledge of anything but what originates, or is found, in their own country; nor have they any tradition [of] how they came to this spot, or from whence they came; having, until the moment of our arrival, believed themselves to be the only inhabitants of the universe, and that all the rest was a mass of ice. (Ross 1819: 123–124)

While the existence of people in the far North may have been rumoured in legend further south, there was certainly a sense of discovery here. The discovery goes both ways, and while Ross made it back south to report what he found, the Arctic Highlanders began assembling at Cape York, the southernmost promontory in the region, each summer, hoping for more ships and more foreign goods for barter. For them, too, a new world had

opened up. During the Little Ice Age, they had been cut off from their more southerly relatives in Greenland and effectively forgotten them, but they were now reminded of the world beyond the packed ice—a world that apparently could supply them with new materials making their lives easier.

Part of the price paid for this was a temporary decline in their numbers. Ross only met a small group and very briefly, but Elisha K. Kane, who visited the region 1853–1855, made a census of the population, suggesting that there were about 140 people at the time. He observed that people were suffering from famine and saw themselves as doomed. Still, their sense of community was remarkable, as was their keeping track of each other. Kane writes:

The narrow belt subjected to their nomadic range cannot be less than six hundred miles long; and throughout this extent of country every man knows every man. There is not a marriage or a birth or a death that is not talked over and mentally registered by all. I have a census, exactly confirmed by three separate informants, which enables me to count by name about one hundred and forty souls, scattered along from Kosoak, the Great River at the base of a glacier near Cape Melville, to the wind-loved hut of Anootok. (Kane 1856, 2: 211)

Within this region, when the sea ice makes travel possible, people move about and exchange news and sympathies and “diffuse through the darkness a knowledge of the resources and condition of all,” as Kane adds. Their limited numbers and collective vulnerability made people alert to one another, and to the conditions for hunting across the region. A few years later when Isaac I. Hayes, who had been part of the Kane expedition, made it back to the region, the population had further decreased: Hayes suggested that it was now close to just under 100 people (Hayes 1866: 386). While numbers are always slightly uncertain, Hayes’s estimate is a hint about the price paid by the Arctic Highlanders. While eagerly awaiting the arrival of foreigners and goods at Cape York, they became exposed to epidemics that would take a considerable toll in a non-resistant population (Hastrup 2019).

All the way through the “first encounters” with the Thule people that have been documented from 1818 onwards, we hear echoes of ancient images of an ice-clad and inhospitable land and of its strange inhabitants. They live more northerly than anybody else, where it is hardly possible to live at all. The Norwegian Eivind Astrup, who was a prominent member of Robert Peary’s first two expeditions in the Thule region in the 1890s, sums it up neatly:

Our small merry brethren in the Arctic regions represent an extremity of the human race; an insignificant section of it, who take up the battle of existence in regions which to our eyes offer poor prospects for life’s sustenance, and where icy death would seem to reign supreme. (Astrup 1898: 48 [Norwegian edition: Astrup 1895: 34])

Wildness, merriness, lawlessness, and freedom—all merge into a sustained image of the unlikely life with the ice, beyond the horizon of civilization.

When Knud Rasmussen first made it to this region with the Danish Literary Expedition (1902–1904) to collect the stories and legends of the Thule people, they were no longer truly unknown, and Peary’s regular presence in the period 1881–1909 had lifted their numbers to around 250 and improved their viability by his paying for their services with rifles and other kinds of goods and new materials (Peary 1898, 1: 511–514). Yet the people were still perceived as belonging to the margins of the human world, judging even

from Rasmussen's otherwise so sympathetic account of his first encounter with them, into which ancient imageries of the barbarians weave themselves:

Never in my life have I felt myself to be in such wild, unaccustomed surroundings, never so far, so very far from home, as when I stood in the midst of the tribe of noisy Polar Eskimos on the beach of Agpat [...]

[...] like a mountain slide, the whole swarm rushed down to the shore, where we had pulled up—a few old grey-haired men and stiff-jointed old crones, young men and women, children who could barely toddle, all dressed alike in fox and bear-skin furs, which create such an extraordinarily barbaric first impression. Some came with long knives in their hands, with bloodstained arms and upturned sleeves, having been in the midst of flaying operations when we arrived, and all this produced a very savage effect; at the moment it was difficult to believe that these “savages,” “the neighbours of the North Pole,” as Astrup called them, were ever likely to become one's good, warm friends. (Rasmussen 1908: 9–10 [Danish edition: Rasmussen 1905: 7–8])

They did become friends, however, and Rasmussen's book provides an extensive record of their life-ways and narratives. In his diary from the expedition, he speculates about how to present them to his future readers, and not least how to find a title for his book that might convey how “the Polar Eskimos are a free people, living in an indisputably free country, *outside of any law*.” We note in passing that Rasmussen's name for the new people he met in the north was Polar Eskimo; this was to be used in anthropology until the late 1970s, when they themselves took to the name of Inughuit.

As for exploration more generally, the Arctic always posed a particular challenge, if we are to believe the Norwegian explorer, Fridtjof Nansen, whose comprehensive history of polar exploration captures the Scandinavian perception. Nansen asserts:

But from first to last the history of polar exploration is a single mighty manifestation of the power of the unknown over the mind of man, perhaps greater and more evident than in any other phase of human life. Nowhere else have we won our way more slowly, nowhere else has every new step cost so much trouble, so many privations and sufferings, and certainly nowhere have the resulting discoveries promised fewer material advantages—and nevertheless, new forces have always been found to carry the attack further, to stretch once more the limits of the world. (Nansen 1911a, 1: 4 [Norwegian edition: Nansen 1911b: 3])

The perceived resistance to penetration of the frozen North accounts for much of heroics so closely associated with Arctic exploration and for some of the passions that drove men to either their success or their demise. An even stronger affirmation of this is found in Antarctic exploration, where no natives were found, at least not of the human kind, and where the magnitude and *unliveability* of the ice suggests that we, the humans, are still “inhabitants and creations of an extended, continuing ice age” (Griffiths 2007: 92).

Within the image of a pristine and primitive life in the High Arctic, however, there was room for rather modern considerations of the far North as an economic asset. After his own first expeditions, Knud Rasmussen urged the Danish government to take action in a region that was increasingly contested between Danes, Norwegians and Americans. The Danish government hesitated, and Rasmussen took it upon himself to establish the Thule trade station in the North Star Bay, renowned for its fine harbour. He organized a private society, called the *Thule Committee*, and found financial support from well-to-do Danes that could supplement a personal loan of a considerable amount. This enabled him, in August 1910, to inaugurate the Thule Station, having a threefold aim: It would open northern Greenland for Danish colonization, it would support scientific expeditions do-

ing research on Eskimo culture within and outside of Greenland, and it would give the Polar Eskimos access to foreign goods and, conversely, serve to export local goods, mainly fur (Sand 1935: 385). The trade station became a major economic success, financing the better part of Rasmussen's seven Thule expeditions, as well as a local health clinic, a new church, a vicarage and so forth.

Invasions. Unmaking Thule

With the trade station, *Thule* had finally found its lasting place on the world map. Mapping is in itself a narrative gesture, by means of which horizons are frozen. Knud Rasmussen chose the name with explicit reference to the ancient Greek term for the farthest North, in Latin *Ultima Thule*, on the absolute outskirts of Earth. The place and its name had disappeared again in the northern mists, from where it would re-emerge later, enticing explorers to new adventures as described by Fridtjof Nansen in impressive detail (Nansen 1911a; Nansen 1911b). The name continued to carry the symbolic load of a place on the absolute margin of the human horizon, a strange "elsewhere" basically up for grabs—irrespective of the almost invisible community. This not only happened in the Arctic, of course, but our focus here is on the repercussions for the inhabitants of Thule, who were so few and seemed so insignificant in the extensive, ice-covered landscape.

A major onslaught came during the Cold War with the establishment of an American airbase in the middle of the Thule region in the early 1950s, neighbouring the trade station on the headland that was also the central village of the entire district, possibly with some 80 inhabitants on average. The Americans not only appropriated a vital and absolutely central part of the Inughuit's landscape but also stole the name *Thule* for the Airbase. The Airbase was designed both to defend "the free world" against (possible) Russian missiles and to cater for scientific experiments, geophysical and meteorological. The native settlement was destroyed and people forcefully relocated in 1953, along with the trade station (Brøsted & Fægteborg 1987). At the time there were roughly 300 native inhabitants in the district, living and hunting along the entire rugged coast of the district, spanning about a thousand kilometres (Gilberg 1976). Closing off some of their hunting grounds and forcing them to abandon the central part of the district was a major infringement upon their lives. Their fewness and their mobility apparently made the Americans consider the land a void, theirs for the taking. This was a result also of the absence of the Danish state. Thule remained outside of general Danish legislation until 1962, and left to its own law, the *Thule Law*, originally established in 1929 (Thule Law 1929).

The biggest American experiment was with the icecap, of whose depth and plasticity next to nothing was known. Despite the lack of knowledge, the construction of an under-ice city began, that would strengthen the bulwark against Soviet interests in the region. It was argued that the observed retreat of glaciers and the "polar warming" that had been predicted by scientists in the 1930s were a threat to US national security interests (Martin-Nielsen 2013: 52). It was therefore adamant to build up a solid, long-range defence line to protect the Free World, and to build a secret base as a bulwark against enemy onslaught. *Camp Century* was the result.

Camp Century was dug into the icecap, some hundred kilometres from the Thule Airbase on the plain, and was a fantasy-engineering project, widely seen as proof of the American power at conquering the arctic environment. It was to be powered by a nuclear reactor, and designed to withstand nuclear war (Petersen 2008; Nielsen *et al.* 2014). Con-

struction began in 1959; tunnels were made, and the under-ice village—complete with living quarters, infirmary, church, library etc.—was praised as a major feat of American technology. The reactor came last, in 1960; it was deactivated already in 1963 and removed the following year.

The problem was that the engineers did not yet know that the apparent stability of the Icecap masked a constant movement caused by gravity from its centre towards the rims, where it eventually breaks off as icebergs. The movement of the ice is common knowledge today, but then it was not—even though it had actually been suggested by Rink in the nineteenth century, as we saw above. What happened at Camp Century was that tunnels and trenches would gradually deform and bulge, and ceilings would give in.

Thus in the summer of 1962 the ceiling of the reactor room had drooped so low that it had to be lifted five feet to avoid fatal contact with the reactor. Subsequently Camp Century was reduced to a summer camp in 1964, when the reactor was removed, and abandoned altogether in 1966. (Petersen 2008: 79)

The stories multiply from there and remind us how deeply the heated geopolitical situation during the Cold War impinged on the global mind, barely noticing what went on in the High Arctic.

Nowadays the inhabitants voice a fear that there is still nuclear waste lying around in the ruined Camp Century corridors that may soon break off from within a glacier nearing the sea. A new social crisis lingers in the living ice. Adding to this, the place has become a hotspot for scientists wanting to understand current climate change. For the people living there, the current changes in weather and wind, and most poignantly in the ice, greatly affect the horizon of certainty within which they can act. The future has become increasingly indeterminate because the space for action has shrunk, at least temporarily, with the dwindling of the ice. This is geo-sociality with a vengeance. Meanwhile we should take note of the fact that neither science nor people ever speak in one voice; there is no unified science as opposed to a unified native point of view—even if it appeared so during the Cold War and was widely entertained, also in anthropology. As



Fig. 1. Film-makers seeking to freeze the past. Photo: Kirsten Hastrup.

has recently been shown for Cold War glaciology in Sweden, always a hotspot for studies of the ice, advances in the field were shaped in a battle between divergent agendas and direct contradictions in depicting the causes of climate change (Sörlin 2009).

In Qaanaaq, the town established in 1953 as the main relocation site under the name of *New Thule*, science is again a powerful presence; geophysicists, biologists, technicians, glaciologists, and some anthropologists, seem to tread on each other's toes, at least during the spring and summer season, when the light allows one to work all day and night, and when the cold is bearable. More often than not, the scientists work with local hunters whose skills at sledging and navigating are necessary to move around on the sea ice or across ancient sledge routes on the glaciers; the hunters are paid according to a fixed tariff, set by their own hunting association. There is mostly good will and collaboration, but also some resentment against science, now crowding their everyday life, along with film crews from all over the globe, explicitly wanting to document "the last Eskimos." People begin to resent being portrayed in the past tense; for the hunting community, their life is both for real and for now. The invasion of curious crowds, however laudable their aims, inadvertently contributes to the sense of fragility in the community. The well-meaning invaders are impatient and rarely have much time to spend, stressing the hunters who cannot "book" a narwhal at a time that suits the filmmaker.

The anthropologist evidently also depends on the hunters to understand what it means to navigate the ice, and to live in this place, but do so by going along with the quotidian—and with enough time to wait for the right moment and an invitation. In that position one cannot but marvel at their skills of navigating the ice, whether solid or cracking, whether by sledge on the sea ice, or by motorboat between ice floes, not to mention their generosity in sharing time and reflections with the patient listener.

In May 2010, when I had joined a party of hunters who were going to the ice edge for camping and walrus hunting, I had a chance to talk at length about the manifest changes in local weather conditions with a seasoned hunter. During our conversation he voiced one of his own theories about the rapid climate change. He suggested rather vociferously that the ice-core drillings carried out by scientists on the icecap were at the base of all the negative changes:

They [the glaciologists] are destroying the icecap. Clearly, they have now drilled in four different places, and obviously the meltdown starts there. A lot of water comes out from under the ice and makes the rest slide. The Americans started it all by carving out large under-ice roads. They wanted to drill all the way towards South Greenland. They were mad.

He had a point about water running under the ice and speeding up the glacier movement, and while hardly an outcome of the ice-core drillings, it still testifies to the ongoing assembling of knowledge and space—as defined by the ice. His outburst combined very different registers of ice-knowledge, with each their temporal and spatial ramifications. It affirmed a highly emotional topography, marked by geopolitics—a specific variant of geo-sociality—and deeply affected the attentive fieldworker (Hastrup 2010b).

Melting. The Ice as Infrastructure

Today, global warming is accelerating exponentially in the Arctic. In a community that has lived *with* the ice since prehistoric times, the current changes are unsettling in a profound sense; as the sea ice dwindles and the glaciers retreat, the ramifications of the

entire social life change conspicuously. The ancient communication with the glaciers, also reported from other Arctic regions, begins to dry out (Cruikshank 2005).

The Inughuit, or the Thule people, have lived and hunted all along the rugged coastline from Inglefield Land to Cape Melville, spanning some 1,000 kilometres, since their arrival around 1250 CE. The more or less temporary settlements have been connected by the sea ice, forming a kind of highway between them for some nine months of the year, when the dog-sledges could go anywhere for hunting and visiting. As the all-important infrastructure, the sea ice also allowed hunters to go to ice edge by the North Water in spring, where they could hunt the big marine mammals that were all-important for their survival. The North Water is a High Arctic polynya, or an oasis that is open all year round even in winter; its extent varies, being rather limited in the deep of winter, and dissolving into the surrounding sea during the summer months (Hastrup *et al.* 2018). It was first discovered by Europeans in 1616 when William Baffin made it across the Melville Bay and found an open sea further north, but seeing no people there. It was forgotten again, and rediscovered by Ross in 1818, when the pack ice on the Melville Bay began to recede at the end of the Little Ice Age. Whatever the season, the North Water—with its specific composition of hydrological, biological, and oceanographic features—is what makes both animal and human life at these latitudes possible all year round, and what originally attracted the incoming Inuit from America in the Middle Ages. The present inhabitants of the Thule region still hunt from the ice-edge, but as the ice now retracts earlier, and becomes thinner or too slushy for sledging, the sea ice is increasingly unnegotiable during most of the traditional season of ice edge hunting; consequently, the hunt has dramatically diminished over the past ten or more years (Krupnik *et al.* 2010). This greatly affects life in the region, and we can see how the geological development begins to undermine social relations, so far partly sustained through the sharing of meat. This is geo-sociality close to home, so to speak; with less meat to share among relatives and dogs, social cohesion is threatened and economic differences between households increase.

There are many kinds of accelerating change in the region; the examples show how social practices and community life are deeply affected by global processes on a macro-geological scale, as captured in the notion of global climate change and in the widely distributed knowledge of the meltdown of the ice in both polar regions. People in Thule are increasingly *dis*-orientated as they try to stick it out in the region, where they have so far lived with the ice. They are perfectly aware of what is going on, sharing and seeking knowledge also on the Internet—accessible for the past ten years. Yet, the question of orientation is not a simple matter of making choices about remaining within or moving away from the region, it is a constant and pressing need to collectively assess the opportunities of the present, and to reason consistently about them on the basis of all available knowledge—because it is now that the future is shaped. The intensifying elusiveness of the place hits the Inughuit hard. Yet life goes on and the hunt still offers up moments of wonder and excitement that fuels the topographic emotions. While people are prepared to seek out new opportunities, they prefer to stay in the familiar landscape, which has been their home for eight hundred years—mostly on their own terms and certainly left to their own ingenuity. Their history shows an impressive viability, with hope and flexibility being strong elements of this (Hastrup 2017).

What is extremely important in a threatened field like the one I have come to know in the High Arctic, where both the landscape and the hunt are increasingly undermined by new climates and interests, is to listen for the stories untold—but certainly lived. The present reaches backward and forward in time, incorporating both past occurrences and



Fig. 2. Packing the sledge for travel. Photo: Kirsten Hastrup.

future imaginaries. A recent experience demonstrated how the doom so often attributed to life in the High Arctic does not detract from moments of success and of deep satisfaction with being a hunter, which in turn lends power to the belief in a local future.

One spring a few years ago, I was back in Thule in time for the spring hunt from the ice edge, which in many ways is an adventure, if also a serious one. A hunter who had taken me out on his dog-sledge before agreed to do so once again. With experience, and through the hunter's quiet instructions over the years, I had become less of a liability, because I had gradually acquired at least some of the muscular consciousness needed to read and anticipate the landscape and the movements of the sledge across the far from smooth ice (Hastrup 2018). Out we went, the hunter, his 16-year-old son and myself on the heavily packed sledge. On our way, sometimes a seal basking on the sea ice by its breathing hole was spotted at some distance, and the sunshine made it quite pleasant to simply sit on the sledge and wait while the hunter silently approached the seal, crawling on the ice against the wind, partially covered by the sliding shoot sail. No impatience on my part. After having been cut up, and the sea having been thanked for its gift by receiving a piece of the liver dropped into the breathing hole, the meat was stacked under the reindeer skin upon which we sat.

We then pressed on to the ice edge, where there was already a campsite, with people waiting for the narwhals that came and went along the ridge of the open water. The whales do not give themselves up easily. There is a rule in the region that one must harpoon the whale before shooting it, so that it is already fastened before it is shot; this is to avoid wasting whales. The hunters must also take them from kayaks, not motorboats, whose noise will scare the pack away, and prohibit a fair distribution between families with different access to powerful engines. In short, it is all very traditional and sustainable—biologically and ethically.

After arriving at the camp we began waiting for narwhals along with the small group



Fig. 3. Cutting up bearded seal under the midnight sun. Photo: Kirsten Hastrup.

of hunters already there, some six or seven of them. During the day a number of packs came into the open water between the ice and the neighbouring island and the hunters duly descended into their kayaks, but in vain. Most of them decided to move further out to enhance the opportunities in more open waters, but we remained. The men were alert, and suddenly the 16-year-old came running past the camp along the ice edge, silently, rapidly and in pursuit of a whale trying to get out of the impasse. I could only look as he sped along, jumping over a couple of ice floes, and finally managing to set the harpoon deep into the whale, and holding on to the line, until his father caught up with him and was able to actually shoot it, and to help fasten it properly. A floater (made of sealskin) was blown up and fastened to the animal, which was then steered back to the camp where all hunters soon congregated, having heard the shot, to help drag it ashore. For this they received part of the *mattak*, the skin and blubber that is a major delicacy and a rich repository of vitamins. The ice-edge had made the catch possible.

This was the young man's first narwhal, and the congratulations, handshakes, and high-fives that he received, as did his father, were unending. The delight in his success spread, and it was to continue. Once the whale was cut up, and the meat and *mattak* silently distributed according to unspoken rules, we returned towards Qaanaaq, sitting on top of the spoils. Although it was around 4.30 in the morning before we arrived, people came down to the beach to congratulate the young man on his first narwhal. The rumour had already spread by the satellite phone in the camp (this is now part of the necessary gear, given the uncertain ice conditions and new disaster patterns—and recent satellite coverage, of course). I was so cold at the time that I could not possibly untie my *kamik*s (sealskin boots), and for the first time ever I experienced the tradition of young women

helping travellers with their boots that I knew from the literature. I had thought it was a matter of masculine dominance, because it had always been related by (male) explorers, but I realized how necessary it could be if people had been travelling, and immobile for too long. Relieved of one more preconception, I could go home on frozen feet in my ordinary leather boots.

When later in the morning I told my hosts about the feat, they were delighted on my behalf and repeated again and again that this was a unique experience, and one that they had never had despite a lifetime in the region. I was heartily congratulated on having experienced a “first catch.” The delight at the young man’s success spread quickly, and it seemed that the entire village talked about it, and about the fact that I had also been there. I was stopped in mid-track over the next few days and congratulated again. Needless to say, I was happy myself, first for having witnessed the successful hunt, and next for experiencing the wider ramifications of pride and pleasure that would unite the inhabitants in a festive atmosphere of celebrating not only the young man but the entire community of hunters for some days. The fact that it was a young man for a moment stalled the sense of their “dying out”—related to the fact that very few youngsters want to become hunters and choose to leave for “the south”—which is everywhere else in Greenland or even in Denmark.

While this is a singular experience, it does speak to the larger issue of the untold stories. The dominant narrative about the High Arctic now is one of catastrophe and cultural loss, owing to a mixture of colonial, climatic, and political threats. This is far too simplistic. After all, people are still there, and they do not live by cultural charters or preconceived roadmaps. The only constant when living with the ice is the imminent challenges that have alerted people to catch the moment, any moment of promise, whether in the shape of ships from the south laden with rifles or of narwhals moving into the fiord and meeting the hunter who is ready and waiting.

So far, the ice has provided an infrastructure for travelling and hunting wherever possible within the region, and while it dwindles—rapidly—people look out for new opportunities, where their ancient skill at seizing any moment will allow them to remain a little longer.

Refrain. Ice and Time

Through this article runs a claim that places and people emerge in dialogue with each other. Implicitly, it has also been argued that there is effectively no distance between the global and the local, the two being deeply implicated in each other, as are past and present. The scales are nested within each other, and they are not necessarily bigger and smaller, but different, also with respect to temporality. *Global* climate change summarizes what *locally* are new experiences of weather and wind. Scholars need to keep both perspectives in mind when dealing with the current challenges to the Arctic as a geographic region and as a lived landscape.

As an anthropologist I do not see myself as an emissary of the Thule people who have taught me about their life and their worries. While coming back again and again over ten years, I cannot but bow to their deep understanding of the environment that they have negotiated and made their home for centuries against all odds. Yet, my role is to *analyse* local actualities and practical experience in relation to larger patterns of climate change across the globe. This implies that I see my friends in the field as agents in their own right, not as specimens—let alone as a cultural entity to be defined by out-

siders. They have to make their own future, together and individually—through their social practices.

To end this story, I shall invoke a notion of *refrain*, as something that marks a terrain through particular motifs and landscapes (Deleuze & Guattari 2004: 356). A refrain in this sense could consist of sounds, which is how birds define their territory, and how church bells have marked European townships. The refrain affords the terrain with a sense of coherence and consistency. One seasonal refrain in Thule re-emerges every year with migrating birds, not least the little auks, coming back each summer to nest and to breed on particular slopes in the region. Their swirling sounds remind people of new promises. Some 30 million pairs of little auks breed in the Thule region every year (Mosbech *et al.* 2018). Yet, in the High Arctic, the dominant refrain rests with the ice—above, below, beyond and within the lived terrain. The sounds of freezing and melting, of glacier streams running, of glaciers calving, of sea ice cracking, of icebergs turning over, of the annual arrival of the narwhals through the pack ice, and of polar bears roaming near the villages when the ice is broken and setting the dogs howling, all of this contributes to the refrain of the ice, by which people know their place. The current changes of weather and climate, and the increasingly dissonant refrain they entail, unsettle the ground upon which the community is built, also quite literally by undermining the rock-solid ground upon which the houses are built on stilts anchored in the ice below. With the weakening permafrost, houses are tilting.

The ice, with all its movements and sounds, has held the landscape together or, indeed, split it up. It has provided the leitmotif of life in the far north, and of the history of exploration as well as of scholarship. It has offered a peculiar combination of extension and intension, offering a vastness of vision, extreme weathers, sonorous sounds of ice, and a particular luminosity, but also offering confined spaces, muted emotions, unheard human voices, barking dogs, and bursts of laughter amidst total silence. The refrain assembles the multiple histories of weather and climate, people and places in the Arctic.

What threatens the High Arctic community at the centre of my analysis is not the dwindling ice as such, but the loss of flexibility. There is (so far) nothing much other than hunting they can live on, while waiting for (possibly) even more massive changes. Yet social resilience depends on flexibility; the main challenge for the Inughuit (and for other people in the Arctic and beyond) is the lack of freedom to experiment and to take risks (Hastrup 2009*b*). Due to the rapidity of the changes, there is not much room for experimentation. Given that the “times of ice” and the “times of life” are totally intertwined, if never synchronic, the ice remains a powerful agent in their history all the while it melts.

NOTES

¹ This article is a revised and translated version of the chapter “Livet med isen. Geosocialitet i Högarktis,” in Gustafsson Reinius (ed.) (2020), pp. 84–111.

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MARTIN JAKOBSSON

The Long Timeline of the Ice

A Geological Perspective on the Arctic Ocean

ABSTRACT Ice ages constitute a significant part of Earth's climate history with the first signs of widespread ice sheets occurring at about 2.4 billion years ago. In 2004, a nearly 450 metres thick accumulation of seafloor sediments on the submarine Lomonosov Ridge in central Arctic Ocean was drilled by the international Arctic Coring Expedition (ACEX). This geological archive has provided insights into the long-term history of the Arctic Ocean back to 56 million years. The first signs of extensive sea ice along the Arctic coasts appear 47.5 million years ago (Ma), while evidence for the type of pack ice we have today that survives more than one season occurs first 15–13 Ma. The Earth's climate changed mode at about 2.6 Ma. Cold periods, characterized by large ice sheets covering the Northern Hemisphere, were intervened by warmer periods with climates more similar of today. These glacial-interglacial cycles were largely controlled by changes in solar insolation resulting from cyclical variations in Earth's orbit around the Sun. In this article, I tell the personal story of how we mapped the Lomonosov Ridge and found evidence supporting a controversial hypothesis of the existence of kilometre-thick floating ice shelves in the Arctic Ocean during past glaciations.

KEYWORDS Arctic Ocean, sea ice, ice sheets, geology, climate, cryosphere, glaciation, ice age, ice shelf, glacial history

Ice ages have come and gone throughout the long history of the Earth.¹ The first signs of widespread glaciation are as old as 2.4 billion years. That long ago, the continents had a completely different configuration than today. It is therefore hardly meaningful to talk about the northern polar region at this time in terms of “an Arctic.” It is only when a land mass has been formed around the geographical North Pole that we can begin to recognize today's Arctic geography in geological reconstructions. The oldest part of the Arctic Ocean began to form about 130 million years ago (Ma) (Pease *et al.* 2014: 7). Our side of this sea, called the *Eurasian Basin*, north of Svalbard, is much younger, having first begun to develop about 58–56 Ma (Vogt *et al.* 1979: 1; Brozena *et al.* 2003: 826). This was during the transition between the geological epochs *Paleocene* and *Eocene*. At that time there was a sea around the North Pole, but it can hardly be called an Arctic Ocean

because it had the character of an inland sea. The Eocene was characterized by a much warmer climate than today, even in comparison to the temperature increase we have experienced over the last century.

Along the bottom of the Arctic Ocean is a ridge 1,500 kilometres long called the *Lomonosov Ridge*, which divides the Arctic Ocean into the Amerasian and the Eurasian basins. During the 56 million year geological history of the Eurasian Basin, marine sediments have been deposited on this long mountain ridge. From a human perspective this is a very slow process, about 1–2 millimetres growth per century. As a result of these sediments, the Lomonosov Ridge is a natural archive preserving a record of how the environment of the Arctic Ocean has developed and how climate has interacted with the ocean. One can even view the seabed sediments as a library, where the various layers are the books and the pages in them are filled with the contents of the sea. Instead of texts and pictures there are sediment particles with different rock fragments and clay minerals, along with remains of zooplankton, phytoplankton and organisms living on the seafloor and in the uppermost sediments. Marine geologists can read the history of the oceans in these seabed sediments. They do so through a microscope, qualitatively identifying the contents of the sediment and by means of quantitative measurements of physical properties and geochemical analyses which can give information about factors such as the temperature and salinity of the oceans at the time the sediment was accumulated.

The roughly 450-metre thick accumulation of seabed sediment in the Lomonosov Ridge was the goal of the international Arctic Coring Expedition (ACEX) in 2004 (Backman & Moran 2009: 158–160). A string of cores from several boreholes that can be connected to a single long sedimentation sequence from the Lomonosov Ridge would give us an archive of how the Arctic ice caps and sea ice have evolved over several million years. But the expedition entailed—to say the least—logistical challenges.²

The Swedish-registered icebreaker *Vidar Viking*, equipped with a drilling rig, had to lie still for several weeks only about 250 kilometres from the North Pole, in drifting pack ice over a drilling area of just over a kilometre of water depth. Coring for samples and being able to maintain one's position over the drilling hole within a radius of 60–100 metres required support from Sweden's largest icebreaker, the *Oden*, and the Russian nuclear powered icebreaker *Sovetsky Soyuz*. As a scientist on board the *Oden*, I was responsible for the geophysical data that showed where we could drill.

Problems with the drilling equipment meant that we were very close to obtaining no sediment cores at all. After spare parts of damaged drill-rig components had been manufactured by the crew of the *Oden*, the material for spare parts was exhausted. The Swedish Air Force then helped out by sending one of their transport planes to drop new parts by parachute. The operation was able to start, and one core after the other was brought up from the information-rich sediment of the Lomonosov Ridge.

Through time a large amount of new data would provide new knowledge about the geological development of the Arctic Ocean. The deeper part of the sediment package from the ACEX expedition turned out to contain, among other things, pollen from palm trees! There were also geochemical indications that the sea around the North Pole, during the warm period called PETM (Palaeocene-Eocene Thermal Maximum) about 55.5 Ma ago, may have been as warm as around 23 °C at the water surface (Backman & Moran 2009: 166). This is in stark contrast to the Arctic Sea as it is today, when the surface water is currently approaching –2 °C. How can the great depth of the geologists' lens help us to understand the consequences of today's climate change, which, even from a human perspective, seems so drastic and full of contrasts? When in the long planetary history of the Earth did the first sea ice appear in the north?

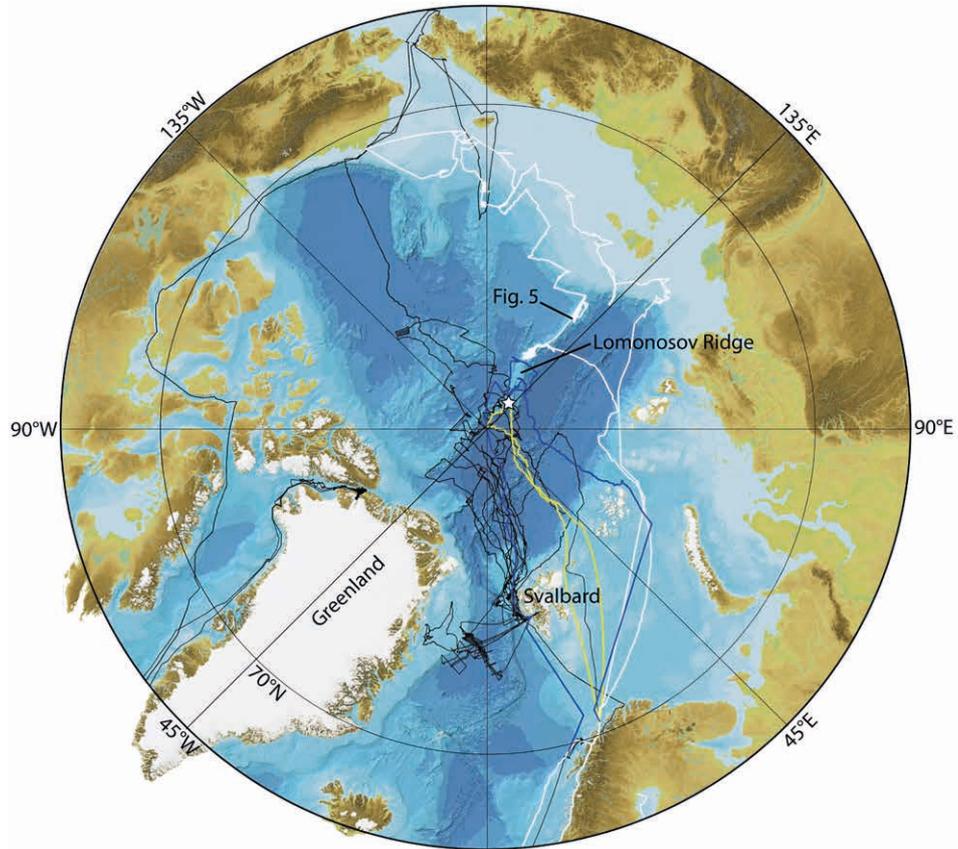


Fig. 1. Map of the Arctic Ocean from the International Bathymetric Chart (IBCAO). The black lines show the routes of expeditions with the icebreaker *Oden*, from the first in 1991 until 2017. The expeditions with the *Oden* discussed in the text are shown in different colours: The yellow line shows the Arctic Coring Expedition (ACEX), the blue line shows the route of the Arctic Ocean in 1996 and the white line is the route of the SWERUS-C3 expedition (Swedish-Russian-US Arctic Ocean Investigation of Climate-Cryosphere-Carbon Interactions). The ACEX drill site location is shown with a white star.



Fig. 2. To carry out the drilling operation during ACEX 2014, three icebreakers were required. Farthest away in the picture, the Russian nuclear powered icebreaker *Sovetsky Soyuz* is splitting the largest ice floes. The role of the *Oden* was to break up the medium-sized ice floes so that the icebreaker *Vidar Viking* (closest) could maintain its position with the drill string anchored in the seabed. Photo: Martin Jakobsson.

The First Sea Ice and Icebergs of the Arctic Ocean

The cores from the Lomonosov Ridge contain the algae known as diatoms, which, among other things, have formed species that specialize in living in sea ice. It was the discovery of these ice-living diatoms which, together with an admixture of coarser particles in the seabed sediment, showed that there has been sea ice in the Arctic Ocean for several tens of millions of years. Was there no alternative explanation for the presence of these traces of sea ice?

The drilling site on the Lomonosov Ridge is too far from land for coarse sediment particles to have been transported by ocean currents along the sea bed, and the particles are too large and heavy to be carried with the wind. Thus, transport by ice remains the most likely possibility. The sedimentation sequence with the diatoms and the coarser particles has been dated to 47.5 Ma (Stickley *et al.* 2009: 376). This is the first trace of sea ice that we know of in the Arctic Ocean, although it was probably a seasonal ice and not the kind of pack ice we have around the North Pole today. There is a great deal to suggest that the Arctic Ocean at that time, 47.5 MA, was similar to today's Baltic Sea. The surface water could be warm in the summer but larger areas froze in the winter. Geological reconstructions show that the comparison is reasonable in several respects. The strait between Greenland and Svalbard had not yet opened to become the sound that it is today with a depth of thousands of metres. The Arctic Ocean therefore lacked deep water connections to other seas such as today's Baltic Sea. The diatoms also show that the upper layer of the Arctic Ocean consisted of slightly brackish to almost fresh water, just like the Baltic Sea, where the salinity is around 0.6 percent at the latitude of Stockholm. In general terms, the whole Earth 47.5 Ma was significantly warmer than today. It was not until many millions of years later that sea ice was formed of a kind that did not melt during the summer months.

Exactly when this occurred is harder to detect in the sediment core from the Lomonosov Ridge, but studies suggest that year-round ice was formed about 15–13 Ma (Darby 2008: 1; Krylov *et al.* 2008: 1). This is assumed to have happened when coarser grains of sand and some specific mineral particles, which are assumed to have come from eastern Siberia, appeared in the sedimentary sequences. The change in the composition of the sediment indicates that this was transported over many years by sea ice, taking a longer time than one seasonal winter ice is likely to manage. This is not to say that year-round ice, i.e., what we know today as the pack ice of the Arctic Ocean, has endured since then. But we can say that the Arctic Ocean has had seasonal or year-round ice for several tens of millions of years, with the exception of several short periods with a limited extent of sea ice or completely ice-free. A stone with a diameter of one centimetre was found in sediment dated to 45 Ma (Moran *et al.* 2006: 601). This stone, which consists of gneiss, was probably brought to the Lomonosov Ridge with an iceberg, thus probably indicating the start of the first land-based glaciers, somewhere around the Arctic Ocean.

Since the Earth's climate, in this million-year perspective, has varied so much, the sea ice has likewise undoubtedly undergone major changes during warmer and colder periods. About 2.6 Ma, during the geological *Quaternary* period, the Earth entered a longer ice age. Gigantic ice sheets spread at regularly recurring intervals, known as glaciations (also called *glacials*). During the longest glacials, ice sheets are known to have covered the whole of Scandinavia, parts of northern Europe, Asia and North America. In the northern hemisphere, the glacials alternated with interglacials, when the ice sheets al-



Fig. 3. The sea ice of the Arctic Ocean in various appearances. Top left, so-called *pancake ice*. Top right, the icebreaker *Oden* and the biggest Russian atomic icebreaker *50 Let Pobedy* ['50 Years of Victory'] are seen during the Lomonosov Ridge off Greenland (Lomrog) 2007 expedition. They are north of Greenland, where the dense and multiannual pack ice can be more than five metres thick. Bottom left, the central part of the Arctic Ocean, where the drifting of the ice over the sea often makes the ice floes overlap each other in what are called *pressure ridges*. Bottom right, the edge of the pack ice with large open areas of water between the ice floes. Photo: Martin Jakobsson.

most completely disappeared. The Greenland ice is an exception, as it is unlikely to have disappeared completely during any interglacial. However, it may have been much smaller during the warmest interglacials. How small they became is a highly relevant question today, given that we are at a stage where the Greenland ice has decreased in mass through melting and calving of icebergs at an increasing rate.

This brings us to human impact on the climate and what we can learn from a longer geological time perspective. The basic causes of the overall variations in the Earth's climate must be sought beyond the emergence of the human species and of vertebrates, in the planetary and cyclic changes of Earth's orbit around the sun. The theory describing the effects on climate from Earth's orbital variations through time was put together by the Serbian scientist Milutin Milanković and is well described in the now classical article by Imbrie and Imbrie (1980). Periods when ice sheets spread, alternating with periods when the inland ice melts and recedes, follow these cycles when both solar irradiance and seasonal variations are affected. Some interglacials are characterized by high solar irradiance and large seasonal variations; there are indications that, in some warm periods, the sea ice in the Arctic Ocean may have melted completely during the summer months. For example, the solar irradiance was much higher than it was today in the period between 11,000 and 5,000 years before the present. Some 11,000 years ago we had roughly 50 W/m^2 higher solar irradiance at latitude 80°N in June than we have today at the same latitude, a difference of about 10 per cent. This is often brought up as the main reason why today's ongoing and dramatic warming of the Arctic cannot be blamed on natural climate changes caused by solar irradiance; it is judged to be mostly due to human emissions of greenhouse gases. The sea ice has been continuously studied using satellites since 1979

and has shown a clearly decreasing trend during the summer months, in terms of both distribution and thickness (Peng & Meyer 2017: 191). This reduction thus cannot be explained in the same way as when the sea ice decreased during earlier warm periods with higher solar irradiance.

A Gigantic Ice Shelf

During the Quaternary, glacials became increasingly extensive. Their geological footprint is also clearly visible in the landscape, as the naturalist Louis Agassiz discovered in the Alps and in Scandinavia in the nineteenth century. The landscape in the Nordic region is still full of visible traces of the movements of ice sheets. You just have to go to any area of flat rock and you will often see parallel grooves in the surface. These are striations, formed when stones that were frozen into the bottom of a moving ice sheet scraped against the rock.

We therefore know quite well how the ice sheets moved over large areas. But what about the conditions in the Arctic Ocean during the glacials? That knowledge came much later because for a long time the sea ice in the Arctic Ocean today made it almost impossible to examine the seabed. To be able even to get to the areas where traces of ice that extended into the sea should theoretically exist, would not have been possible without modern icebreakers and research programs using submarines of Arctic class.

When there are no data, there is plenty of scope for creative hypotheses. In the 1950s Maurice Ewing and William L. Donn presented a theory of how cold periods with large-scale glaciation and intermediate periods without ice have come and gone through the Earth's history (Ewing & Donn 1956; Ewing & Donn 1958). Their hypothesis was that the Arctic Ocean must initially have been ice-free so that large ice sheets could have spread on land. The argument was that it must have required moisture from the sea to create precipitation which then, during a glaciation of the Arctic, could freeze to ice. When it is cold enough for sea ice to form on the Arctic Ocean, the moisture source disappears, which means that the large inland ice sheets shrink and recede. A cycle is completed. The British glaciologist John Hainsworth Mercer arrived at a diametrically opposite conclusion. He conceived of a sea where a floating *ice shelf* a kilometre thick spread out around the North Pole while there were large ice sheets here and there on land (Mercer 1970: 19). (An ice shelf is a floating extension of one or more glaciers that can be on land but flow into the sea. Today there are large ice shelves around the South Pole in the Antarctic. The biggest is the Ross Ice Shelf, with an area of about 470,000 square kilometres, slightly larger than the whole of Sweden. There are also ice shelves in the Arctic, although much smaller than those at the opposite pole. Some fiords around Greenland, where the Greenland ice sheet flows into the sea, also have ice shelves. They can also be found along the northern part of Ellesmere Island, in the north-easternmost part of Arctic Canada. When the inland ice flows into a fiord, we usually call it an *ice tongue* instead of an *ice shelf*.)

Mercer's hypothesis of a giant ice shelf in the Arctic Ocean was based, among other things, on comparisons with the western Antarctic—where the floating Ross Ice Shelf is fed by ice floating from the West Antarctic ice cap. That both areas are located at the geographical Poles he felt was important because this gives long, cold winters with no sunlight. He also cited the Swedish glaciologist Valter Schytt and the physical geographer Gunnar Hoppe, who suggested that the Barents Sea was covered by ice during the last glaciation, which culminated about 20,000 years ago, which meant that ice must have

floated north towards the Arctic Ocean north of Svalbard (Schytt *et al.* 1968: 207). The hypothesis of a huge floating ice shelf in the Arctic Ocean provoked extensive debate among scientists. Most were very dubious, but there were some who embraced the idea. These included the Russian geographer Mikhail G. Grosswald and the American glaciologist Terence J. Hughes, who developed the concept in several articles (e.g. Hughes *et al.* 1977). Until the 1990s there were no observations from the seabed in the central parts of the Arctic Ocean which could either confirm or refute the hypothesis, and so the debate continued.

The Search for the Lomonosov Ridge

My first icebreaker expedition in the Arctic Ocean was with the *Oden* in 1996. I was a Ph.D. student and my project was to carry out geophysical mapping and sediment sampling on the Lomonosov Ridge. This was then unexplored, apart from some samples and depth measurements that could be obtained by occasional drifting ice-drift stations. Given that the area of the ridge is almost 70 per cent of the area of Sweden, available data were scarce. It would be like mapping the whole of Sweden's topography by measuring the altitude along one or two motorways! After fighting our way through the pack ice, we finally reached an area where the Lomonosov Ridge, according to the then existing maps, appeared to be suitable for sampling the bottom sediment. We carried on searching for the shallowest parts of the ridge and at places where no mass wasted sediment from the flanks could have been mixed in the layers on the seabed. To our surprise, the ridge was not located where the latest American map from 1985 showed it. It was even further from what was marked on a map from 1979 in the International Series *General Bathymetric Chart of the Oceans* (GEBCO) (Johnson *et al.* 1979). Where there was supposed to be a summit at a depth of 1,000 metres, the depth was instead almost 3,000 metres and the seabed was almost entirely flat.

With the help of echo sounding we found that the Lomonosov Ridge was actually 200 kilometres further away! There, on the other hand it was "only" 607 metres deep, suggesting that we had found the peak of the underwater ridge that rises highest from the deep basins surrounding it. We were forced to accept the fact that we had relocated an entire submarine mountain ridge on the map of the Arctic Ocean. This led me into the work of mapping the bottom of the Arctic Ocean.

It later turned out that the reason why the entire Lomonosov Ridge was displaced on the GEBCO map was that the depth contours had been determined by sonar measurements from one of the first US nuclear submarines that crossed the Arctic Ocean. Navigation in a submarine is based on dead reckoning between different fixed points at the surface, where the submarine surfaces through the pack ice and calculates its position. The location of the American submarine was simply not known properly and thus the depths obtained by echo sounding were wrongly placed.³

Once we had managed to locate and reach the crest of the Lomonosov Ridge, it was time to use our *chirp sonar*. In the 1990s this type of penetrating echo sounder was still the very latest in geophysical mapping, a new way to obtain more detailed information about the upper layers of sediment than before. At best you can penetrate about 200 metres of the sediment layer and see whether this uppermost area is undisturbed or has been subjected to erosion. In practice it was not an easy task. The chirp consisted of a towed device with an echo sounder that was mounted in a part that we called "the fish." This was made of fibreglass and painted in the typical yellow colour that marine

instruments often have, and it weighed over 200 kilos. It was to be towed by the *Oden* in the wake that forms behind the ship when the ice has been broken. This wake could look rather like Stockholms Ström on a day when the water from Lake Mälaren is flowing at its maximum and the thaw is in full swing. We took it in turns to stand on the aft deck, holding the radio, to make sure that pieces of broken ice floes did not get caught in the towing wire. This happened anyway on a number of occasions, and every time we thought that this had put an end to the data collection. We sounded the alarm and managed to get the person who was steering the icebreaker to slow down. With a lot of effort, a few sonar profiles were collected from the crest of the Lomonosov Ridge. However, it turned out that this was not the undisturbed seabed we had hoped for and which would have been required to take sediment cores. Instead we could see on all the profiles from depths less than 1,000 metres a very noticeable erosion surface. It looked as if a huge bulldozer had scraped every part of the Lomonosov Ridge that we had measured, shaving the crest. What could have caused this enormous trail? Could it be erosion by currents, internal waves, deep icebergs or perhaps even the widely debated kilometre-thick ice shelf?

When we were busy with measurements and sampling, the announcement came that the Russian atomic icebreaker *Yamal* was heading towards the North Pole with tourists. The first non-nuclear-powered surface vessels that reached the North Pole were the *Oden* and the German *Polarstern*, which came there together in 1991. Four Soviet nuclear powered icebreakers had been there before, the first in 1977. In other words, active research icebreakers were few and far between in the pack ice in the 1990s. The captain of the *Yamal* therefore wanted to come aboard to see how research was conducted in the midst of the ice. It was a spectacle in its own right when tourists from the *Yamal* were flown over to the *Oden*. In view of what it cost to travel on the *Yamal* to the North Pole, most of the tourists were multimillionaires and from every imaginable nation, perhaps with more from the United States than anywhere else. Their research guide was none other than the previously mentioned geographer Mikhail Grosswald, one of the few scientists who had advocated for the theory of the huge floating ice shelf. He was of course curious about whether we had obtained any data from the seabed. I showed our sonar profiles and said that we had taken a sediment core from the mapped erosion surface that was so hard that the big sampler bent through almost 90 degrees. Grosswald threw out his arms and exclaimed: "You have found proof for the existence of our great ice shelf."

In retrospect, it seems almost uncanny that I happened to meet Mikhail Grosswald in the middle of the Arctic Ocean just after we had discovered that the Lomonosov Ridge had been eroded by a kilometre-thick ice shelf. However, with the small amount of data that we had obtained from the 1996 expedition, we did not yet dare to draw the conclusion that Mercer was the first to suggest: that a kilometre-thick ice shelf once covered the entire Arctic Ocean. After all, we had only investigated an area shallower than 1,000 metres. In any case, I published an article where the new profiles were shown in 1999 and presented the ice-shelf theory as the most plausible explanation for the erosion on the Lomonosov Ridge crest (Jakobsson 1999: 111). The dating of the sediment cores from the eroded areas showed that the traces were not from the last glaciation but much older. The erosion could be linked to the glaciation that ended approximately 125,000 years ago.

In the Right Place

There have since been more expeditions with the *Oden* and other icebreakers, which have mapped further traces of deep-moving ice that once scraped the seabed. It was not until 2014, when we performed a more systematic mapping of the Lomonosov Ridge with the *Oden* on the expedition SWERUS-C3, i.e., the “Swedish-Russian-US Arctic Ocean Investigation of Climate-Cryosphere-Carbon Interactions,” that I felt confident that there had been a kilometre-thick ice shelf at these latitudes during a previous glaciation.

With the help of the multibeam echosounder that the *Oden* installed in 2007, we were able to get a detailed three-dimensional image of the seabed. This is completely different from the profile with depth values that an ordinary single-beam echosounder provides. Now it would be possible to see how land formations were created by ice shelves and icebergs on the seabed, just as clearly as when we see the traces of the Quaternary inland ice on land and from the air. I had often dreamed of returning to the Lomonosov Ridge with modern multibeam echo sounder to measure the crest of the ridge. It ended up happening eighteen years after the discovery of the erosion, on the 2014 expedition.

Towards the end of SWERUS-C3 we were working north of the New Siberian Islands, where the Lomonosov Ridge meets the Siberian continental shelf. The mapping was facilitated by the creation of an opening in the sea ice, with open water that extended far up towards the North Pole. When thick sea ice is broken during measurements with the multibeam echo sounder, there are serious disturbances in the data. Measurement results from situations where there is little or no ice are infinitely better. We therefore took advantage of this opportunity, and started systematic mapping of the shallow areas of the Lomonosov Ridge to the north. Amazing data poured in, showing clear traces of an ice shelf passing over the ridge, “planing and raking” its crest. Where the depth was less than 1,000 metres we systematically encountered these traces of the ice.

I do not know how many times a scientist can be as lucky as this—being in the right place in the right conditions and with the right measuring equipment. I was now firmly convinced that the hypothesis of a kilometre-thick ice shelf in the Arctic Ocean was correct. Already during the expedition we started writing an article that was published shortly afterwards (Jakobsson *et al.* 2016: 1).



Fig. 4. Traces on the crest of the Lomonosov Ridge show that this type of floating glacier ice in previous glacial periods covered the entire Arctic Ocean. The picture shows the front of the Antarctic’s largest ice shelf, the Ross Ice Shelf, which has an area of about 470,000 square kilometres. Only about 11 per cent of its total thickness is above water. Several Antarctic ice shelves have fronts that are more than 50 metres tall, which means that they reach deeper than 405 metres. Where the ice shelf transitions to stand on the bottom, i.e., where it becomes inland ice, it often reaches a depth of more than a kilometre. Photo: Martin Jakobsson.

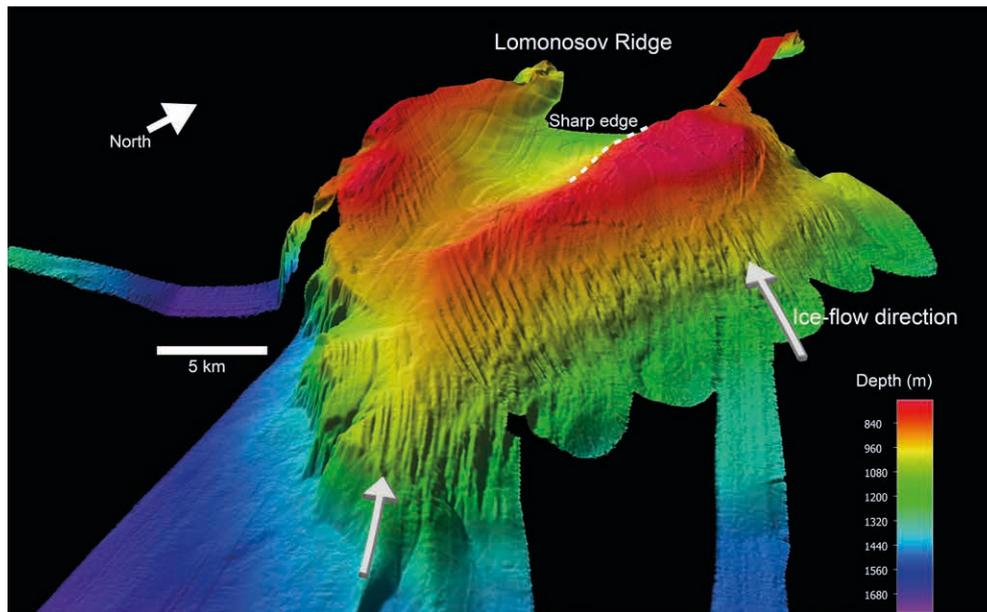


Fig. 5. Three-dimensional visualization of the crest of the Lomonosov Ridge showing where it was abraded by a kilometre-thick ice shelf. The image was created from measurements by multibeam echo sounder from the expedition on the *Oden*. The dotted line marks a sharp edge. The arrow to the right shows the direction in which the ice moved. See Fig. 1 for location on the Lomonosov Ridge.

NOTES

- ¹ This article is a revised and translated version of the chapter "Isens långa liv. Ett geologiskt perspektiv på Norra ishavet," in Gustafsson Reinius (ed.) (2020), pp. 50–71.
- ² It was conducted by the international drilling programme IODP (Integrated Ocean Drilling Programme) and the Swedish Polar Research Secretariat. Jan Backman, professor at Stockholm University, was the scientific leader of the expedition together with Kate Moran, then professor at the University of Rhode Island in the United States.
- ² Today, the work on the Arctic depth map is directed by researchers at Stockholm University. It is part of a project called "International Bathymetric Chart of the Oceans" (IBCAO), which was started in Saint Petersburg in 1997, one year after the expedition with the *Oden*.

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KYRRE KVERNDOKK

The Age of Climate Change

Cultural Change Temporalities and Crisis Awareness

ABSTRACT This article elaborates the multiple temporalities of climate change discourses and practises and discusses some possible common denominators in the timescales and time structures related to global warming. It first examines some of the key concepts in climate research, before discussing vernacular notions of time. Finally, some expressions and tropes that have impacted a trans-national popular climate discourse are examined. The timescales and temporal structures discussed have quite different extents, from millions of years to a generation or two. Some of these temporalities are chronological while others are cyclical. They are also about completely different phenomena—from geology to society and kin. However, the article concludes that they are interconnected through their focus on the present moment, and the temporal structure of *kairos*, in Frank Kermode's understanding of the term. In that regard, they are temporalities expressing a notion of a contemporary crisis, that is both urgent and of almost cosmological propositions.

KEYWORDS climate change, Anthropocene, the great acceleration, experiential time, family time, geological time and historical time, temporalities

Will the entire ice sheets covering Greenland and Antarctica eventually melt away?¹ If so, at what pace? How long will it take before it is too late to slow down the melting? And how much will the world's oceans rise? Questions like these are discussed by climate scientists, the news media, and an increasing proportion of the general public (e.g. Overland *et al.* 2019). In a special report on the Paris Agreement from 2018, the IPCC claimed that even a relatively moderate rise in temperature, such as the agreed limit of 1.5 degrees will still lead to continued ice melting for hundreds and thousands of years, and the sea level will rise in pace with this (Allen *et al.* 2018). And millions of people in completely different parts of the Earth will be displaced due to the rising sea level. This future scenario illustrates that the Earth is united as one climate system. It simultaneously shows how crucial the time dimension is in research, in politics, and in media representations of climate change issues. Anthropogenic climate change is not merely about higher temperatures, rising sea levels, climate refugees and extreme weather, it is also about time and temporality. Climate change is about entangled timescales, the rate of change, acceleration, paleoclimatic data and imaginaries of the future.

This article will elaborate on the multiple temporalities of climate change. I will explore the multiple aspects of the temporality in climate change discourse and examine some possible common denominators in the timescales and time structures related to global warming. The premise for the article is that time is both a universal physical phenomenon and a dimension of social life. On the one hand, time as it passes is completely independent of humankind. On the other hand, when time is experienced, described, measured or used as a device for synchronizing or comparing events and processes, it will always also be culturally and historically situated.

Climate change is on one side defined by geophysical temporality and might be regarded as universal, but as climate change also is affecting social life, the temporal dimension of climate change is also a cultural concern. This entwining of historical processes, human experiences and physical processes makes climate change temporality complex. In this article, I will explore the multiple temporalities of climate change from three empirical starting points. First, I will examine some of the key concepts in climate research that have eventually also become part of a popular climate change discourse. Second, vernacular notions of time will be discussed and contrasted to the academic concepts. Finally, the article will focus on some expressions and rhetorical tropes that have had a broad impact on Western climate discourse at the intersection of politics and mass media. These tropes are used to discuss how the relationship between the present and a climate-changed future is narratively framed.

The Anthropocene and the Great Acceleration

One of the concepts that has had the strongest impact in the public discourse on climate change is the *Anthropocene*—the geological age of humankind. The concept is just 20 years old. At the end of February 2000, the International Geosphere Biosphere Program (IGBP) held a conference in Cuernavaca, Mexico. Atmospheric chemist Paul Crutzen was one of the delegates. According to the anecdote, he was disturbed by the reference to the Holocene, the geological epoch that started at the end of the last Ice Age, when the other researchers talked about human impact on the Earth system, and said, seemingly spontaneously: “We are no longer in the Holocene anymore. We are in the ... *Anthropocene!*” (Warde *et al.* 2018: 165, italics in the original text).

Crutzen was not just anyone. Less than five years earlier he had been awarded the Nobel Prize in Chemistry for his work on the mechanisms that form and break down the ozone layer. He was also one of the initiators of the IGBP programme. His comment attracted considerable attention; in the next newsletter from IGBP he published an article, together with the biologist Eugene Stoermer that was simply called “The ‘Anthropocene.’” There they expanded on the thoughts behind Crutzen’s outburst at the conference a few months earlier. It was not a scientific article in the strict sense. The text was just over a page long and was formulated almost as a policy statement (Crutzen & Stoermer 2000: 17). Crutzen and Stoermer adduced various arguments showing that the human impact on the Earth system had become so extensive that science could no longer ignore the geological and ecological power of humans. Thus, we had entered the geological epoch of humankind. The statement soon impacted the natural sciences.² In 2009 an international stratigraphic commission appointed a working group to examine the designation of the new epoch. Seven years later they published their report, which ended up supporting Crutzen and Stoermer. The working group concluded that the influence of humankind on the Earth System had become so

fundamental that the Anthropocene must be reckoned as a distinct geological epoch (Zalasiewicz *et al.* 2017).

One of the questions this group discussed was when the Anthropocene began. Crutzen had proposed the Industrial Revolution as the starting point. The Agrarian Revolution was another suggestion. The working group, however, advocated the years around 1950. One core argument for suggesting that period was the testing of nuclear bombs. These tests had left lasting radioactive traces all over the Earth. Another, and equally important argument, was that several social, economic and demographic processes were significantly intensified around that time. This also concerned the human use of natural resources and thereby also emissions of CO₂ and other greenhouse gases (Zalasiewicz *et al.* 2015). In Earth System science, the temporal concurrence of these processes is referred to as *the great acceleration*. This concept was coined by Crutzen and two of his colleagues in 2007, as a contribution to the Anthropocene debate (Steffen *et al.* 2007).

The great acceleration is often portrayed as a series of uniformly designed graphs. These curves are pretty flat before they quickly point upwards, not unlike horizontal hockey sticks. In the article where the concept was launched, fifteen such steeply rising curves are reproduced. Twelve of them are presented in one sequence, to demonstrate the correlations in the exponential global growth in areas as diverse as pollution, gross domestic product, foreign direct investment, damming of rivers, consumption of water and fertilizer, urbanization, number of McDonald's restaurants, number of motor vehicles, number of telephones, and international tourism (Fig. 1). "The Great Acceleration is clearly shown in every component of the human enterprise included in this figure," as the scientists write in the caption to this sequence of graphs (Steffen *et al.* 2007: 617). In a follow-up article from 2015, the number of graphs has been increased to twenty-four; twelve of them show socio-economic changes while the remainder illustrate changes in the Earth System (Steffen *et al.* 2015). The visual presentation is undoubtedly effective and convincing. It arouses in the reader a precarious feeling that there is simply more and more of everything and that the world is spinning faster and faster.

This kind of visual rhetoric is not new for environmentalism. Similar graphs played a central role in the seminal environmental report *Limits to Growth* from 1972 (Meadows *et al.* 1972). It contains a total of 48 graphs with an average of three and a half pages of text in between them. Most of these curves point unmistakably upwards. Environmental scholar Kristian Bjørkdahl argues that the report established a visual rhetorical repertoire for environmentalism in the shape of the graphs and especially hockey stick graphs (Bjørkdahl 2018: 164). This repertoire has also been used by Anthropocene researchers.

The hockey stick graphs illustrate how the development is approaching a critical point, a *tipping point*, where the effects of the human impact on the Earth system become irreversible. The tipping point that has probably been most discussed in recent years concerns the concentration of CO₂ in the atmosphere. Today this has passed 400 ppm (parts per million) and the curve is pointing steadily upwards. Scientist and activist James Lovelock claims that 550 ppm is a "point of no return." There is still a little way to go before we get to that point, with today's figures of emission it will be reached around 2050 (Hessen 2018: 43). Others claim that we have already passed the tipping point. In 2008 the think tank The New Economics Foundation started a 100-month long countdown until 1 December 2016. This was, according to the think tank, the time that was left to save the planet. The countdown could be followed on the website Onehundredmonths.org. The site says: "When the clock stops ticking, we could be beyond our climate's 'tipping point,' the point of no return." The clock has long since stopped tick-

SOCIO-ECONOMIC TRENDS

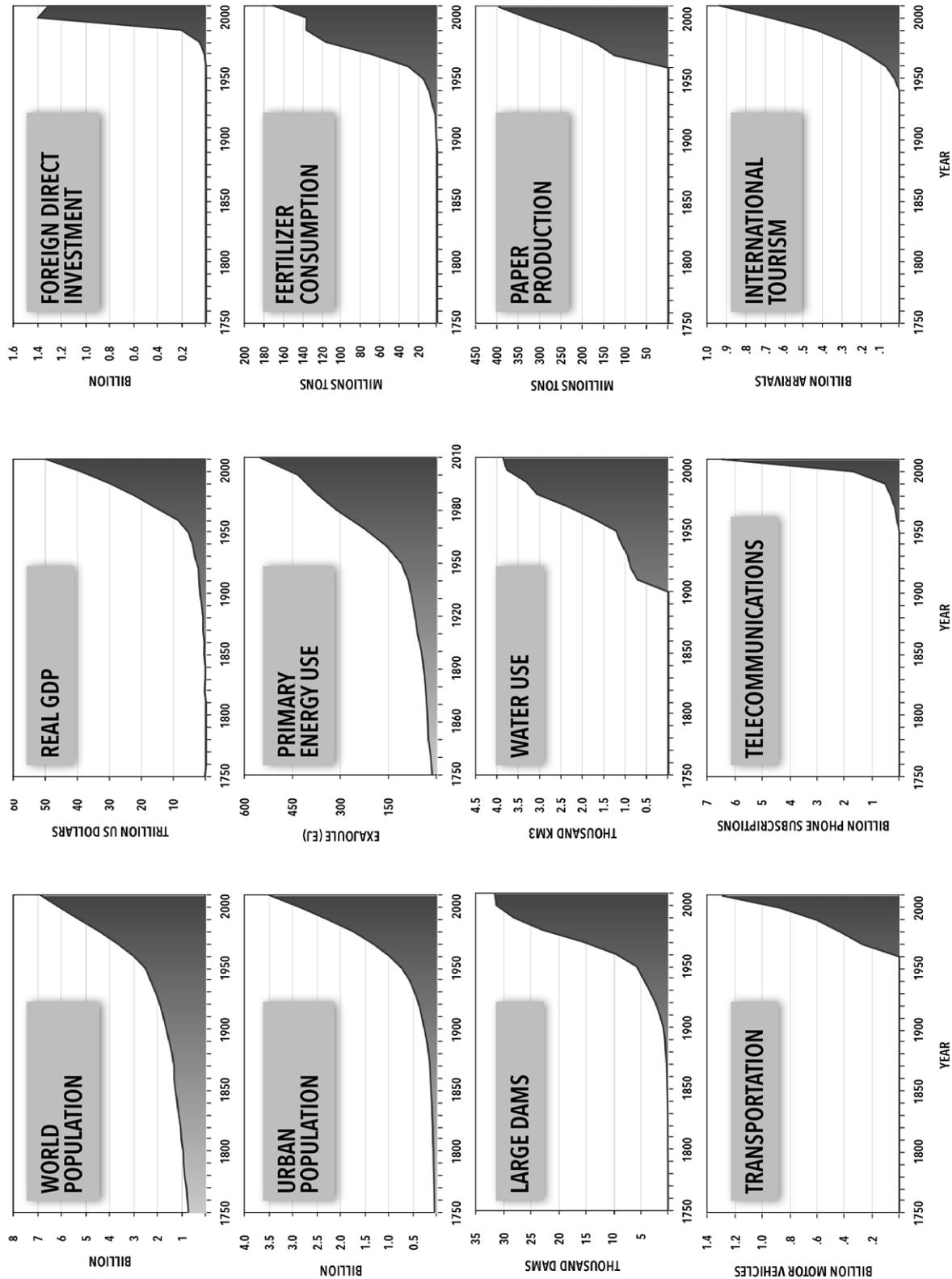


Fig. 1. The great acceleration as hockey stick curves. Illustration from Angus (2015). Diagram by Jamil Jonna (with adjustments December 2019) with data from Steffen *et al.* (2015). Printed with permission from the *Monthly Review*.

ing. The site still exists, but it is no longer updated. It is like a wrecked memory of a time when it was not yet too late.³

Geological and Historical Time Intertwined

The argument for introducing the Anthropocene as a geological epoch was not only about the extent of human influence on geology and ecology, but also about the duration. Geological epochs span long stretches of time. It is no more than 10,700 years since the *Holocene* replaced the previous epoch, the *Pleistocene*.⁴ That epoch, however, goes back more than 2.5 million years in time. Two of the members of “The Anthropocene Working Group” even argued that the human impact on the Earth System was so pervasive that the Anthropocene should not only be counted as a separate epoch, but as an *era*, which is a superior level in geological periodization. They claimed that there were compelling reasons to argue that the *Kenozoic era*⁵ was over, that is to say, the era that started 65 million years ago, when a large meteorite impact led to the extermination of the dinosaurs, after which mammals took over.⁶

From a geological perspective, humanity has a brief history. To name a geological epoch after humankind implies nevertheless that humanity is inscribed in what geologists call *deep time*. The assumption is that the imprint humankind makes on the globe will have consequences far into the future. Crutzen and Stoermer pointed out that contemporary human emissions of carbon dioxide will be measurable at least 50,000 years from now. The main argument for introducing the concept of the Anthropocene—the great acceleration—is the synthesis of socio-cultural and economic processes with such long-term geological consequences. In addition, certain specific events are often invoked, the previously mentioned nuclear tests after 1945, and also the invention of the steam engine in the eighteenth century and the internal combustion engine in the nineteenth century.

Several historians have focused on the long temporal aspect of the Anthropocene. The best known is Dipesh Chakrabarty. He has published a number of articles about how the Anthropocene impacts the notion of history (Chakrabarty 2009; Chakrabarty 2014; Chakrabarty 2018). His main argument is that the distinction between historical and geological time has collapsed (Chakrabarty 2009: 207 ff.).

It is, however, important to have in mind that these timescales actually are of the same kind. *Geological time* and *historical time* are both entities created by scholars. As linear and chronological scales describing processes of change, they are also modern inventions. They gradually divided as distinct timescales from the middle of the eighteenth century, as timescales representing the two emerging domains of the natural sciences and the human sciences. Both these timescales operate at a macro level. While geological deep time refers to the history of the planet, historical time refers to the history of humanity. (In a strict sense, historical time is even narrower. As the timescale of history as an academic discipline it is confined to the time period documented in written sources.) Thus, both timescales are global. Moreover, they have a similar structure; they are chronological, and are organized as epochs and periods. It is primarily the duration that separates them. Whereas geological time operates with millions and billions of years, historical time covers decades, centuries, or at most two or three millennia. Hence, Chakrabarty’s claim is first and foremost about duration. His statement that the distinction between these timescales has collapsed implies a considerably expanded geological extent to historical time. At the same time, the divide between nature and culture as domains of knowledge is blurred. This intertwining also implies that human history must be re-

garded as the history of a species, according to Chakrabarty. He points out that it is at the level of the species that humans work as a global and geological agent. The span of this entwined timescale is overwhelming and, he writes, transcends the scope of the human comprehension of history (Chakrabarty 2009: 221).

In other words, the entwining of timescales, which is summed up in the concept of the Anthropocene, implies that a lasting geological significance is ascribed to historical events and processes. And protracted geological processes can be changed or terminated in an instant. For instance, in just half a century, modern society has consumed major parts of the Earth's oil reserves. The oil that was formed over millions of years is transformed, within seconds, inside the internal combustion engine to become nitrogen oxides, carbon dioxide and water vapour. It is basically this transformation that has led to the climate crisis. The dimension of the crisis is central aspect of the Anthropocene concept. Thus, the concept also implies an orientation towards the present-day and immediacy. It signals that events and actions of today are about to change the world fundamentally. The hockey stick graphs look almost as if they extend past the length of the chart's y-axis, and this trend must be urgently reversed. The intertwining of the instantaneous and the almost eternal can scarcely be grasped intellectually, and it is more or less impossible to experience.

Experiential Time

Neither geological nor historical time are experiential timescales. They are academic tools for organizing events and processes in relation to each other. They are scales that measure and describe time through dates and intervals, but neither of them can be experienced directly.

Historical time is a timescale that describes changes in society over time (Hareven 1977: 59; cf. Koselleck 1985). It is the timescale of the discipline of history, and it is made commonly known through popular history and history teaching in school. Societal changes can of course be experienced, but such experiences are not necessarily the same as experiencing historical time in a strict sense. Societal changes are not necessarily experienced as historical processes per se, nor is it possible for people to experience events beyond their own lifetime. It is also difficult to fully imagine events that go further back in time than a few generations.

While it is difficult to experience historical time, it is completely impossible to experience the slow geological processes that are measured in geological time. A schooled eye can register how geological time has been deposited materially, for instance in ice cores. However, in order to be able to read the temporal information embedded in the layers of such a sample, advanced technological instruments are required.

Ice cores are important sources of information for climate research. Samples from Antarctica can provide information about the atmospheric climate as far back as 800,000 years ago. At the same time, these cores contain traces of human influence on the atmosphere, such as traces of nuclear tests and greenhouse gas emissions. Such ice core samples played a central part in Crutzen's argument when he launched the term *Anthropocene* (Antonello & Carey 2017: 193).

Ice cores are frozen time in cylindrical form. They visualize and materialize how deep time, so to speak, melts away when rising temperatures cause the ice sheets to melt. Such samples have been given a central role also in representing climate change, according to environmental historians Alessandro Antonello and Mark Carey (Antonello & Carey 2017). The ice cores are closely associated with the ice sheets from which they

are extracted. The widely shared understanding of the large inland glaciers as archives of climate history does something to the gaze of the climate-conscious Western audience. Images and films of calving glaciers and melting icebergs illustrate the accelerated earth processes of our time—how deep time processes are so to speak speeding up, how temperatures and sea levels are rising. These pictures are beautiful and spectacular, and simultaneously frightening. They show that the climate is changing right now, at this very moment.

The significance of the melting ice is, however, of a different kind from an experiential perspective. Just a generation ago, the ice off the north-west coast of Greenland was thick and stable for nine to ten months each year. Today it lasts three to four months, and even during this short period it might be unstable. For the locals, the ice represents completely different forms of time than the intertwining of historical time and deep time. The ice, as anthropologist Kirsten Hastrup describes in her contribution to this special issue of *Journal of Northern Studies*, is integrated in everyday life (Hastrup 2020, this issue). For an Inughuit living from traditional hunting, the game, the hunt and the ice are interlinked aspects of a way of life (Hastrup 2013: 77 ff.). According to Hastrup, the ice works as infrastructure for travelling and hunting. The rapid changes in the ice cycles thus create changed living conditions which can have severe consequences for the hunting communities. From the perspective of an Inughuit hunter, it is not deep time that is melting away with the ice. It is a traditional way of life that is vanishing, drip by drip.

Two central temporal forms in the Inughuit society are *the annual cycle* and *tradition*. Both are local, experiential aspects of everyday life. The rhythm of the year is cyclical and repetitive, while tradition is the aspect of social life that binds together the past, the present and the future, and thus represents cultural continuity (cf. Bauman 1972: 33; Glassie 1995: 409.).

In a traditional society, it is not the clock or the calendar that organizes the rhythm of work, but the variations and rhythms of nature. Tradition and the annual rhythm of nature are closely linked in a hunting society like the Inughuit. These temporalities are also closely connected in an agrarian society. In Scandinavian pre-industrial agrarian society, there was a finely-tuned interplay between the rhythm of nature and the organization of the working year and of social life. This changed during the nineteenth and early twentieth centuries. In the seminal book *Culture Builders*, ethnologist Orvar Löfgren has shown how time during the century was gradually disciplined into synchronized clock time both in the countryside and in the cities (Frykman & Löfgren 1987: 13 ff.). But even though the rhythm of work, the daily rhythm and the annual rhythm have been subordinated to clock time, the contemporary organization of time in everyday life is still not disconnected from the course of nature nor from the entanglement of tradition and the rhythms of the seasons.

In primary industries such as agriculture, fishing and reindeer herding, the interplay between working life and rhythms in nature is still substantial, and shifts in this rhythm can have serious consequences for these kinds of livelihoods in quite intricate ways. In reindeer herding, for example, when birch trees come into leaf earlier than usual it may impair the quality of the reindeer's milk. This is because, in the spring, they eat the birch buds, and the level of acidity changes as the leaves grow larger. Calving, however, occurs at the same time each year, and the consequence is that the new-born calves get milk containing more acid than is good for them.⁷

Annual climatic cycles and shifts in nature also affect the rhythms of everyday life even for those who do not work in primary industries. In the Nordic countries people

talk a lot about the weather. It is not only because Nordic people might have a relatively narrow small talk repertoire, but also because weather and seasonal variations structure social practices. Weather and the seasons prevent or facilitate activities such as gardening, beach life, picnics, having a beer at a sidewalk café, berry picking, mushrooming, biking, hiking and cross-country skiing. Nature's annual rhythm also finds cultural expression through annual festivals. Holidays such as Midsummer and Christmas not only mark the changes of nature over the year; through their repetitive character, they also create continuity and a sense of stability over the passing years. Furthermore, such rituals produce memories and imaginaries about what the weather and the seasons ought to be like. This is perhaps most directly expressed in the longing for a white Christmas, "just like the ones we used to know," to quote Irving Berlin.

The rhythm of the seasons is built into the annual cycles of society. The seasons are the basis for how the year is organized as working time and holiday time, and they are also the basis for the annual cycle of the educational institutions. The ritualization and institutionalization of the seasons make the social season into a tenacious cultural structure. What happens to the institutionalized rhythm of the year when the weather changes and the seasons shift? Anthropogenic climate change will eventually affect the rhythm of the seasons, and it is likely that this shift in rhythm also will affect the social year with its well-established and institutionalized rituals and traditions.⁸

Family Time

Experiential time is also present in the language used to discuss climate change in politics and the mass media. This is especially true when the future is brought up. While climate modelling and climate agreements operate with more or less arbitrary years, such as 2030, 2050 and 2100, the future is not given a date in the same way when climate policy or climate research is popularized. It is instead invoked as "the future of our children and grandchildren."

The French President Emmanuel Macron's speech to the Congress, when he visited the USA in April 2018, works as an example. One of the topics he addressed was anthropogenic climate change. He argued the importance of international agreements in order to bring about a transition to a low-emission society. This was an implied critique of the US decision to withdraw from the Paris Agreement. He did not mince his words. One of the rhetorical highlights came when he looked out over the assembly and asked: "What is the meaning of our lives, really, if we work and live, destroying the planet while sacrificing the future of our children?"⁹

"Our children" is a well-established trope in both climate politics and mass media coverage of the climate crisis. It might be tempting to ask why children have been given this central role in depictions of a future with a drastically changed climate; the Norwegian climate scientist Bjørn H. Samset has explained it in this way:

It is difficult to reach people when the major consequences of climate change are far into the future. You have to appeal to people by saying that it will get worse for their children and grandchildren.¹⁰

According to Samset, the invocation of children is thus a strategy to translate the abstract knowledge of climate research into something related to human experience, (Skjong 2016). There is no reason to doubt that he is right. But "the child" trope is more than just a pedagogical tool.

Literary scholar Rebekah Sheldon argues that this trope represents a heteronormative reproductive futurism. It reproduces hegemonic social norms by projecting them into the future (Sheldon 2016). One of her examples is Al Gore's bestseller *An Inconvenient Truth* from 2006. The book opens with a photograph of the young couple Al and Tipper Gore. They are sitting in a canoe on a river. Al is paddling while Tipper is resting her hands on a heavily pregnant belly. The caption reads: "Al and Tipper one month before the birth of their first child, Karena, on the Caney Fork River, Carthage, TN, 1973" (Gore 2006). The text is informative, but it does not explain why this image of family happiness and the imminent birth of a child should open a book about climate change. The most obvious explanation is that a climate-changed future is understood in reproductive terms (Sheldon 2016: 38).

At the same time, the child trope has an inherent temporal structure, which organizes the relationship between the present and the future. Time is counted in generations, not years. This way of thinking about time is termed *family time* by social historian Tamar Hareven. Family time is a timescale based on individual life experiences. Through key life events such as childhood, adolescence, weddings, childbirth and parenting, the individual experiences are embedded in family cycles. Family time is lived and experienced time. At the same time, it transcends the individual life course, in the form of parents' and grandparents' time—or as children's and grandchildren's time. Both the past and the future thus become relational entities, which are about the relationship between self and past and future generations (Hareven 1977: 59).

The trope "our children" follows the relational logic of family time. It is a trope that describes not only the future, but also the relationship between the present and the future. When a climate-changed future is described in such terms, it is just as much about "us" as about "the children," in the sense that "our children" are "our" responsibility. And it is "our" task to ensure a safe future for "our children." This is how the trope was used by Macron and Gore. It is a trope that emphasizes today's actors. Future generations are at the mercy of today's actions.

While children in other contexts tend to be kept outside the political debate, this rhetoric enables them to make their views on climate policy heard. In Autumn 2018, 15-year-old Greta Thunberg became world-famous when she started her school strike for the climate. Six months later, she addressed global leaders at the World Economic Forum in Davos:

Adults keep saying: "We owe it to the young people to give them hope." But I don't want your hope. I don't want you to be hopeful. I want you to panic. I want you to feel the fear I feel every day. And then I want you to act. (Thunberg 2019: 24)

She turned the temporal trope "our children and grandchildren" into her position of enunciation. Her speech was a testimony of a time-traveller, traveling back in time from the future.

The Future as a Narrative

Climate research endeavours to make precise forecasts of changing climate. Climate modelling has a key role when other scientists, politicians and community planners try to predict the future. But future climate change is not the same as *the future*, and climate modelling cannot predict the future of society. The future depends on people—on the economy, technology, politics, culture and religion. These factors are far less predictable,

and cannot be foreseen fifty or a hundred years in advance (cf. Hulme 2011). The figures in the climate models show changes in certain climate factors. These are certainly alarming, but in order to understand their societal consequences, they need to be put into social and cultural contexts. These contexts are to a large extent only accessible through imaginaries and narratives. While the past exists as experiences, memories and physical remains, the future does not exist. It merely exists as expectations and imaginaries, and is enunciated through narratives.

One of the terms that is often used to describe a climate-changed future is “climate catastrophe.” This expression is usually written in the singular with the definite article as “the climate catastrophe.” The term brings together the various individual consequences of global warming into a single overall phenomenon. The catastrophe is termed as a single disaster, and it will affect everyone (Kverndokk 2015: 245 ff.). The corresponding Norwegian term, *klimakatastrofen*, first appeared in newspapers in 1984. Back then it referred to what the climate might be like after a nuclear war. But within a few years the term was instead linked to anthropogenic climate change.¹¹ One of the first times it was used in this way in an international context appears to have been 11 August 1986. That day the front page of *Der Spiegel* had this headline “Ozone-Loch, Pol-Schmelze, Treibhaus-Effekt: Forscher Warnen: Die Klima-Katastrophe.” As an illustration of the scientists’ warnings about the ozone hole, the melting polar ice caps and the greenhouse effect, the magazine chose a manipulated photograph of Cologne Cathedral. The cathedral was under water, with just the roof and the towers sticking up over the surface, and it was surrounded by open sea. The allegory of the Great Flood was obvious (Weingart *et al.* 2000; Schenk 2009: 219).

In the Western world, biblical disasters such as the Flood and the apocalypse provide a cultural framework for interpreting disasters in the present and the future (Holm 2012). Interpretative frameworks like these are tenacious cultural structures, which have survived the secularization of society. Today, the apocalypse is a dominant cultural model for describing a climate-changed future (Hulme 2008: 10 ff.). But the apocalypse is not just about the future. It is a narrative type that structures the relationship between the present and the future, and it is just as much about the present.

The climate apocalypse is not an apocalypse in the strict sense—it does not mark the end of the earthly world and the transition to a heavenly state. The apocalypse is rather a metaphor for a more or less total societal collapse, and a transition to what is called a post-apocalypse in popular culture (Kverndokk 2018: 159 f.). While the apocalypse in the Christian sense is due to take place sooner or later, transforming mortal life into celestial life, in the secular climate apocalypse there are instead earthly alternatives. The narrative of the climate apocalypse has a plot with two possible outcomes. The alternative to destruction tends to be described in terms of sustainable development, and a transition to a low-emission society. Nevertheless, the apocalypse metaphor brings associations to Christian eschatological beliefs about sin and punishment. In Christian eschatology it is the accumulated sins of our times that lead to the apocalypse. This is also the case in climate eschatology. That is to say: in climate-eschatological terms, humankind does not sin against God, but against future generations, against nature and the Earth. The apocalypse is nevertheless connecting the present and the future, in the sense that it is actions in the present that determine whether the apocalypse will come or not.

The apocalyptic climate catastrophe threatening our children’s future was also what Macron alluded to in his speech to the US Congress: “I believe in building a better future for our children, which requires offering them a planet still habitable in 25 years.”¹²

Imaginarities of a climate apocalypse gain further nourishment through *the tipping point* metaphor (Hulme 2008: 11). It is not just countdowns like *Onehundredmonths.org* that have used this term in an apocalyptic sense. So have the IPCC. When IPCC's *Fourth Assessment Report* was presented in 2007, the chairman Rajendra Pachauri said: "If there's no action before 2012, that's too late." And he added: "What we do in the next two to three years will determine our future." He repeated the same message at the launch of the next main report in 2015 (Bjørkdahl 2018: 163). And when the IPCC in 2018 published its report on the 1.5-degree target of the Paris Agreement, the media reception was equally apocalyptic. Under the heading "UN Says Climate Genocide is Coming. It's Actually Worse Than That" the American magazine *The Intelligencer* wrote:

[T]he real meaning of the report is not "climate change is much worse than you think", because anyone who knows the state of the research will find nothing surprising in it. The real meaning is "now you have permission to freak out". (Wallace-Wells 2018)

What Macron, Pachauri and articles like the one in *The Intelligencer* have in common is that they relate a future disaster to actions that are required here and now.

The End is Now

Literary scholar Frank Kermode has shown how "a sense of ending" has influenced notions of time in Western culture. According to Kermode, the relationship between an apocalyptic ending and the present follows a temporal structure he terms *kairos*. This is one of two Greek words for time. While *chronos* means the time that passes, *kairos* is the moment that decides how everything will end. It is, according to Kermode, "a point in time filled with significance, charged with a meaning derived from its relationship to the end" (Kermode 1967: 47). In other words, the end is embedded in this moment. If there is one temporal structure which might seem to unite the different ways in which anthropogenic climate change is described, it is the structure that Kermode terms *kairos*.

The timescales and temporal structures discussed in this article are all about the relationship between the past, the present and the future, but in vastly different ways. They have different extents in time and operate at different levels of scale. Some of them are linear while others are cyclical. They are also about completely different phenomena—from geology to society and kin. Nevertheless, they are interconnected through their focus on the present moment.

A common denominator is that lasting changes are now taking place, whether it is accelerating processes towards a tipping point or changes in annual rhythms and traditional ways of life. At the same time, it is also now that these changes can be slowed down, stopped or reversed. In the present, individual actors, be they politicians, scientists, activists or ordinary people, will be in contact with almost cosmological entities.¹³ When climate change is debated by scientists, politicians or popular media, the present is the crucial moment—for the future of the children, of humankind, of civilization and the biosphere—of the whole world. Although the climate crisis opens up long and almost unfathomable time perspectives, the age of climate change is also the age of the moment (cf. Hartog 2015). It is an age defined by the urge to act or refusal of action.

NOTES

- ¹ This article is a revised and translated version of the chapter “Klimatförändringarnas tid. Kulturella perspektiv på krismedvetande” in Gustafsson Reinius (ed.) (2020), pp. 164–181.
- ² In recent years, the concept of the Anthropocene has been criticized both because it is anthropocentric and because it presents the results of capitalist economic development as a general human phenomenon. However, the critics do not deny the idea that human actors have affected the biosphere and the Earth System in fundamental and dangerous ways. In this article, it is precisely human activity that is in focus. I shall therefore not go into the critique and instead focus on the temporal structure of the Anthropocene. See e.g. Moore (ed.) 2016; Haraway 2016; Malm & Hornborg 2014.
- ³ www.onehundredmonths.org/; access date 10 July 2020.
- ⁴ The etymology of the names of the geological ages is not particularly informative. The term *Holocene* is composed of the two Greek words *hólos*, ‘whole’ and *kainós*, ‘new,’ and thus simply means new, while the *Pleistocene* is derived from *pleiōn*, ‘more’ and *kainós*, ‘new,’ and thus simply means newer than the previous epoch.
- ⁵ ‘New life,’ from Greek *kainós*, ‘new’ and *zōē*, ‘life.’
- ⁶ Media Note: Anthropocene Working Group (AWG), www2.le.ac.uk/offices/press/press-releases/2016/august/media-note-anthropocene-working-group-awg; access date 30 January 2017.
- ⁷ Oral presentation of the phenologist Kjell Bolmgren at our joint seminar on natural and cultural time, Nordiska museet, Autumn 2017.
- ⁸ Questions such as these are examined in the research project “Calendars. Co-production of Seasonal Representation for Adaptive Institutions,” led by Scott Bremer at the University of Bergen, Norway. The project started in 2019 and will last for five years. In the course of these years, we will have more knowledge of how seasonal variations and societal institutions are or are not synchronized in the age of climate change.
- ⁹ YouTube, “French President Macron Addresses Congress 4/25/18,” www.youtube.com/watch?v=su-E5rDLntg; access date 3 May 2018.
- ¹⁰ In Norwegian: *Det er vanskelig å nå frem til folk når de store konsekvensene av klimaendringene ligger frem i tid. Man må appellere til folk ved å si at barna og barnebarna dine vil få det verre.*
- ¹¹ Nasjonalbiblioteket, NB N-gram; [www.nb.no/sp_tjenester/beta/ngram_1/#ngram/query? terms = menopause & lang = all & case_sens = 0 & freq = rel & corpus = Avis](http://www.nb.no/sp_tjenester/beta/ngram_1/#ngram/query?terms=menopause&lang=all&case_sens=0&freq=rel&corpus=Avis); access date 24 November 2018.
- ¹² YouTube, “French President Macron Addresses Congress 4/25/18,” www.youtube.com/watch?v=su-E5rDLntg; access date 3 May 2018.
- ¹³ Thanks to Anne Eriksen for this formulation.

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DAG AVANGO

Imprints on the Resource Landscape

The Long History of Mining in the Arctic

ABSTRACT For several years, public debates about the future of the Arctic have included the growing global needs in minerals and energy resources. To explain and manage this development, it is important to understand impacts of previous extractive industries in the north. Using theoretical approaches from economic geography and science and technology studies, the aim of this article is to describe and explain the growth of mining in the Arctic and its consequences for people and environments. How and why have minerals in the Arctic been constructed as natural resources? What systems have been built to extract them, and what were their consequences? How has the legacies of mining been managed when the extraction has ceased and why? The development of mining is explained as resulting from not only economic interests, but also geopolitical considerations, institutional frameworks and cultural-ideological trends. The same drivers are involved in the making of post-extraction futures and the way people relate to the mining legacies through environmental remediation, re-purposing and heritagization.

KEYWORDS mining, environmental impacts, social impacts, socio-technical systems, heritagization, environmental remediation, Arctic, Norrbotten, Greenland, Svalbard

The dramatic decline of the summer time ice coverage in the Arctic Ocean, has raised hopes that it might become easier to access natural resources in the Arctic.¹ For several years, public debates about the future of the region have often reflected an interest in minerals and energy resources. It is mainly global economic forces that lie behind this thirst for resources, driving up prices and demand for minerals. To explain and manage this development, it is important to understand how the interest in the Arctic's natural resources has grown over time and the consequences this has had (Avango & Högselius 2013; Avango *et al.* 2014; Vikström & Högselius 2017).

The mining industry in the Arctic is not new. On the contrary, it has been operating since the seventeenth century. Mining, although it has not been the only raw materials industry in the circumpolar region, occupies a special position historically, partly because of the great economic value it has generated, partly through its often far-reaching implications for communities and environments. The mining industry has meant different things to different people. What some have perceived as a hope for economic

growth, a geopolitical resource, a source of income and the basis of a functioning life, has for others meant an unwanted reshaping of living environments, a threat to culture, lifestyle and other land use. The mining industry has also left its imprint on landscapes and minds—a legacy that people have had to deal with.

The definition of a mine is sometimes a topic of debate, especially in controversies over new mining projects. Is it just the mine itself that should count as an environmental consequence? Or should we also take into account the impact of transports and energy supply? Without taking a stand in such debates, more and more researchers are trying to apply as holistic a perspective as possible. Inspired by the historians of technology, in this chapter I have used sociotechnical system theory (Hansson 1994; Hansson 1998; Hecht 2004; Hughes 1983; Hughes 1987; Kaijser 1994). The basic idea is that technology cannot be understood outside its social context, but always as part of larger systems that also have societal elements. This means that mining consists not only of mineral deposits, pits crushing and enrichment plants, but also of infrastructures for transport and energy, and of people such as workers, service personnel, and engineers, and of entire communities with housing and service. Considered as sociotechnical systems, the mining industry also consists of organizations—companies, government agencies, associations—as well as the laws, rules, and practices that govern the activities. The system also includes market players who influence demand and prices. A holistic perspective like this is needed to describe and explain the emergence of the mining industry and its consequences for communities and environments. Without a holistic approach, it is also difficult to assess the potential and consequences of the mining industry in the future.

A related question is what constitutes a natural resource. The human geographer Gavin Bridge has stressed that this is not something that can be understood as existing in an independent sense (Bridge 2009). Nature consists of various physical and biological phenomena, but if these are to become natural resources, people have to attribute a value to them, and there must be sociotechnical systems to extract and transform them. From this theoretical starting point I shall try here to explain the growth of the mining industry in the Arctic and its consequences. How have minerals in the Arctic been constructed as natural resources? What systems have been built to extract them, and what consequences have these had for humans and environments? How has the legacy of the mining industry's systems been managed when the extraction has ceased?

Early Modern Mining

People in the Arctic extracted minerals from rock long before colonists and mining industrialists arrived there—in North America copper, in Greenland soapstone, quartz, and iron from meteorites (Cooper 2011; Sejersen 2014). It was not until the seventeenth century that people from the south began to take an interest in large-scale extraction of minerals in the Arctic. The mining industry they built up resulted in two important changes. One was the establishment of a new order in which it was mainly powerful players from economic and political centres in the south that extracted the Arctic's natural resources, to generate and use profits outside the northern region. The second was that the Arctic thus became a target for the emerging European colonialism.

An example of this development is Sweden, where the crown in 1635 established a silver mine deep in Sami territory, at Nasafjäll on the border with Norway, which was then part of the kingdom of Denmark. The mine—located high above the tree line—was linked to a smelting plant and a settlement at Silbojokk east of the mountain chain, with shipment from ports on the coast of the Baltic Sea hundreds of kilometres from

there. The miners were brought from the south, while local Sami were forced to handle the transports (Nordin 2012). That this happened at this time and in this place was because the Swedish state needed more finance to wage war in Europe, and according to the dominant economic idea of the time, mercantilism, this was best acquired through precious metals such as silver. At the same time, the state looked at northern Scandinavia through the eyes of an aspiring colonial power. This was a time when European states such as Spain, Portugal, Holland, and England were starting to build colonial empires, from which the crown and trading houses could enrich themselves with precious metals and other commodities. As the archaeologists and cultural heritage researchers Magdalena Naum and Jonas Monié Nordin have pointed out, the Swedish state and the elite of society had similar ambitions, as exemplified by the establishment of the Delaware colony in 1638 and the Swedish Africa Company's trading post at Cabo Corso in West Africa. The attitude of the crown to Nasafjäll is hinted at in the words of the Councillor of the Realm Karl Bonde: "With God's help, this will become the Swedes' Caribbean" (Ekengren *et al.* 2013: 169).



Fig. 1. Remains of the seventeenth-century Kengis iron works, by a rapid by the Torne River. The works and the river itself was a part of large socio-technical system for mining and steel making in the Swedish Arctic. Photo: Dag Avango.

In 1645, a decade after the opening of the mine at Nasafjäll, the state gave private operators rights to begin iron production at Kengis in what is today the municipality of Pajala. They built up a system of mines, blast furnaces, hammer forges, and transport routes that came to cover the entire Torne valley (Moiné Nordin & Ojala 2015). These mining ventures were not the only ones in northern Scandinavia in the early modern period. Mineral resources were also a central component of other countries' colonial interests in the north, such as the Danish colonization of Greenland from 1721 (Stenfoss & Taagholt 2012: 78). What these mining enterprises had in common, however, was that none of them generated much income. In fact, the operations lasted only a few decades.

The colonialists who made their way to the North American Arctic in early modern times were looking for other resources. They mainly wanted furs and whale oil rather

than minerals. In the Eurasian Arctic, likewise, those active in fur hunting played an important role in propelling the Russian colonial expansion in Siberia from the end of the sixteenth century (McCannon 2012: 78–100). All in all, these efforts helped establish a new way of imagining the Arctic—as a region suited to colonial expansion and exploitation of natural resources for markets in the south.

Mining in the Industrial Era

The great expansion of the mining industry in the Arctic began in the mid-nineteenth century. The reason was the rapidly accelerating industrialization in Europe and North America, which created a growing demand for metals (Vikström 2016). Iron was used to make the machinery of the new factories, to build railway locomotives, wagons, and rails, and later a growing amount of consumer goods. In Sweden, the iron and steel industry increased production from about 76,000 to 1,000,000 tonnes between 1830 and 1900 (Isacson & Nisser 2011: 92–96). Electrification led to a greater demand for copper, whose conductivity was utilized in everything from wires to lamps. In order to supply the cities' electric power stations, the factories' steam engines, and the railway engines with raw materials, there was also a rising demand for coal, the main source of energy at this time. The mining industry grew most vigorously in already established mining regions, but when prices were high the mining companies also turned their eyes to deposits in areas located farther from the industrial economy's central areas, including the Arctic. New research on the geology of northern areas, as pursued at universities, academies of sciences, and government organizations, also contributed to this, along with local people's knowledge of where minerals could be found (Avango 2005).

It was not only economic changes that attracted industrialists to establish mines in the Arctic. Sverker Sörlin is one of those who have demonstrated how the north of Sweden was established as a land of the future in the nineteenth century in literature, media and art. A new Sweden would be built using the riches that lay concealed in the northern mountains and forests, not only through resource extraction but also through science and cultural improvement. The craze helped to stimulate economic players to seek their fortune in the Arctic (Sörlin 1988*b*; Sörlin 2002). Global colonialism also contributed to the interest. Since the early modern period, several colonial powers had expanded, especially in continents where the Scandinavian countries lacked the strength to compete with the great empires. The exception was the Arctic (Avango *et al.* 2017).

The development of technology was another factor contributing to the growth of the mining industry, as exemplified by the large iron ore mines in the interior of Norrbotten—Malmberget (established in 1888) and Kiruna (1900). These iron ore deposits had been known since the seventeenth century, but no one had shown any interest in starting mining operations there. One reason was that the ore contained too much phosphorus, which made it unsuitable for the manufacture of steel. From the end of the 1850s, the steel industry developed new technology to increase production capacity. The Thomas process, introduced in 1878, made it possible to produce high-quality steel even from iron ore that was rich in phosphorus. For mining industrialists this made the extraction of Norrbotten's ore financially lucrative (Hansson 1998).

Another obstacle was that the deposits were in the middle of the country, in an area that lacked infrastructure for moving large volumes of ore, equipment and staff to and from the coast. The mining industry solved this with the help of another great innovation of the nineteenth century, the railway. In 1882, the state granted a concession to a British company to lay rails from Luleå on the Gulf of Bothnia to the ore deposits in

Gällivare. It was completed in 1888. That same year, a British mining company was able to start large-scale mining for iron ore at the site where the town of Malmberget was later built (Sörlin 1988a).

Another factor contributing to the establishment of the iron ore mines in Norrbotten was that the state played an active role in the project. To ensure that Swedish actors gained control over deposits and infrastructure, the state took over the construction of the railway to the iron ore deposits at Kiirunavaara and Luossavaara and on to Narvik in Norway, from where the ore would be shipped from the ice-free harbour on the Atlantic. At the same time, companies controlled by Swedish capital owners took over the mines. LKAB (Luossavaara-Kiirunavaara Aktiebolag), founded in 1890, established the mines and the town of Kiruna in 1900. LKAB also took over the ore mining in Malmberget. In 1907, the state increased its control by buying up half the shares in the company, thus helping to expand production. In order to acquire a productive and loyal workforce, LKAB provided comparatively good housing and service to its communities in Kiruna and Malmberget, and Kiruna especially would become a model town. To supply railways, mines and communities with sufficient electricity, the state began the industrialization of the Lule River by building the Porjus hydroelectric power station in 1910. Shortly afterwards, Boden fortress was built, partly to defend the system against foreign attackers (Brunnström 1981; Hansson 2015; Sörlin 1988a).



Fig. 2. Kiruna, the largest mining town in the Swedish Arctic, built to be an ideal model town. Because of the ongoing mining operations, the municipality and the mining company needs to re-locate or pull down many buildings. The church in the image will be moved to a new location. Photo: Dag Avango.

The historian of technology Staffan Hansson has coined the term *technological megasystem* to describe the huge mining system that state and business built up in Norrbotten (Hansson 1994). The system helped to create a path dependence, which partly explains the dominant position that the mining industry attained and still enjoys in northernmost Sweden. The existence of railways, roads, energy supply and communities with housing and service helped to make it profitable to extract other minerals in the vicinity of the system. One example is the company AB Nautanens Kopparfält, which

established the copper mine and the town of Nautanen in 1903 and connected it to the railway via a cable car to Koskullskulle, near Malmberget. Another is Svappavaara, a village near the ore railway, where LKAB established a new iron ore mine in 1965 when the demand for metals increased during the record post-war years. Svappavaara, like Kiruna, was provided with modernist new housing designed by the star architect Ralph Erskine. In 1968 Boliden established the copper mine of Aitik south of Gällivare, with electricity from new hydroelectric power stations in the Lule River, with housing and services in Gällivare, and with transport capacity on the ore railway for the copper concentrate that Boliden shipped to its smelting plant in Rönnskär near Skellefteå. From the beginning of the twentieth century, mining industries and the state established systems for mineral extraction also in the Finnish and Norwegian Arctic, although these differ in several ways from the megasystem in Norrbotten (Avango *et al.* 2019). Base metals are still mined throughout northern Fennoscandinavia.

The Swedish state is not alone in having turned the Arctic area into a resource landscape for the nation. A similar development can be seen across much of the Arctic, and today it is a dominant feature in mineral rich areas in the region. One reason for starting mines in the Arctic has been the demand for rare minerals. An example is cryolite, which various Danish mining companies extracted at Ivittuut in southwestern Greenland from 1857. Initially, cryolite was used to produce soda that could be used to manufacture soap, glass, and alum for tanning and for the pharmaceutical industry. From around 1900 the mineral became more interesting for aluminium production, partly because it contains aluminium, partly because it could be used to extract aluminium from bauxite. When the aluminium industry introduced synthetic materials that could replace cryolite, demand fell and in 1987 the mining company ended its operations at Ivittuut (Vikström & Högselius 2017).

The mining industry also expanded in other parts of the Arctic in the second half of the nineteenth century. In the North American Arctic, more specifically Alaska, Russian actors found gold as early as the beginning of the century. With the gold rush in the Klondike, Yukon, at the end of the nineteenth century, mineral extraction was pursued on a larger scale. Here too, the context was colonial, with thousands of gold-prospecting settlers and later mining companies establishing themselves in areas inhabited by indigenous peoples. The really large expansion came only after the end of the Second World War, with the extraction of nickel, zinc, lead, gold, precious stones, and uranium (Keeling & Sandlos [eds.] 2015). In the Russian Arctic, the mining industry was established first in the European part of the country at the end of the nineteenth century, later expanding eastwards from the 1930s, partly within the framework of the Soviet prison camp system (Avango *et al.* 2014).

As is evident from the Swedish example, national and geopolitical interests have contributed to the establishment of mining in the Arctic. Another illustrative example comes from the archipelago of Svalbard, which was uninhabited when it was discovered in 1596 and which until 1920 had the status of a no-man's land. Coal could be found there, at that time the main raw material for energy, with a steadily growing demand. From the early twentieth century, companies established mines and communities there to mine these deposits and sell coal on the energy markets of northern Europe. Now states were also beginning to take an interest in the archipelago. Norway was first, as political actors in 1906 began to express the idea that Norway should take administrative responsibility for the archipelago. Their justification for this was that the lack of a state power led to intractable conflicts between rival mining companies and between workers and

companies. The Swedish and Russian governments were firmly opposed to Norwegian sovereignty of Spitsbergen. However, they did agree that law and order was needed there and therefore advocated shared Norwegian-Swedish-Russian governance. The interested states negotiated the issue in 1910, 1912, and 1914 without reaching agreement. The main reason was national prestige. For Norway, which had just gained independence after the dissolution of the union with Sweden in 1905, the Spitsbergen issue became part of the nation-building project. For the Swedish government it was a way of maintaining Swedish leadership in foreign policy issues in Scandinavia, while the Russians wanted to defend what they considered to be their historical rights. With the outbreak of the First World War in 1914, national access to coal became another increasingly important motive for the involvement of states. To strengthen their negotiation positions, all states supported mining companies from their own countries, because their land claims and facilities could be said to represent what was called effective occupation, which, according to international law at the time, legitimized political influence. Against this backdrop, and because of the high prices of coal during the First World War, companies from a number of countries chose to establish mining communities in Svalbard (Avango 2005; Avango *et al.* 2010; Berg 1995; Berg 2004; Lajus 2004).

The geopolitical interests of states also contributed to the survival of the Spitsbergen mining industry through the twentieth century. In 1920, the Spitsbergen Treaty was signed, giving Norway sovereignty over the archipelago but simultaneously guaranteeing companies from signatory states the right to extract natural resources there on the same terms as Norwegian actors. Most companies, however, abandoned their mining sites when coal prices fell after the war. Only Norwegian and Soviet mining companies stayed on. The Norwegian companies, which were working in a market economy, incurred losses which were covered by the Norwegian state because the mines were seen as a prerequisite for maintaining Norwegian settlement and thus the legitimacy of the treaty. The Soviet mines did not have to make a profit because they were intended to cover energy needs in north-western Russia as part of a plan economy. However, there is great deal to suggest that the Soviet Union also maintained its mining communities during the Cold War for geopolitical reasons, for purposes of surveillance and influence in the archipelago (Avango *et al.* 2014; Berg 2011).

The expansion of the mining industry in the Arctic since the mid-nineteenth century is therefore due to the fact that a growing number of actors have attributed values to mineral deposits in the rock. Economic values have been most important—values that have been mainly utilized by actors from the south. Geopolitical and strategic values have also played a role, as have affective values conjured up by storytelling and art. The major sociotechnical systems established by industry then opened up opportunities for others to build new industries. In other words, the systems have tended to strengthen the use of the Arctic as a region for natural resource extraction, but at the same time, as Dieter Müller has shown, other industries such as tourism have been able to establish themselves there (Müller *et al.* 2019).

Imprints on Society and the Environment

The mining industry has often sparked debate, not least its operations in the Arctic. The reason is that mines, for better or worse, always have consequences for humans and environments. The material imprint of the operations is a tangible one. Open pits are perhaps the most visible: wide and deep abysses that can hardly fail to make an impression on anyone who sees them. The imprint of underground mines is different. Few people

notice the openings of LKAB's mines in Malmberget and Kiruna, but the operations undermine entire communities, forcing the company to demolish buildings or to move and build new in other places. In Malmberget this has been going on since the 1950s and will result in the disappearance of the entire town. In Kiruna, the town is being moved to a new site, a project that has received a lot of attention in Sweden and abroad (Sjöholm 2013).



Fig. 3. Open pit mine for iron ore extraction at Schefferville, Quebec, Canada. Photo: Dag Avango.

The imprint of mining also includes waste—in the form of the rock that is separated from the ore and the sand that is a residual product of enrichment, the process by which the metal content of the ore is concentrated. In Sweden, where almost all mining is conducted north or just south of the Arctic Circle, waste rock and sand accounted for 77 per cent of the total waste from all industry in the country in 2016, 58 and 49 million tonnes respectively (Naturvårdsverket 2018). Waste rock tips and sand tailings can leach environmental toxins such as cadmium and lead where companies mine sulphide ore. Other imprints include the infrastructure of the mining industry—roads, railways, and dammed rivers—as well as the towns that were built so that the mines' staff would have somewhere to live.

One effect of the mining industry in the Arctic is the emergence of ghost towns. These often arise because the industry is particularly sensitive to changes in the world market and mining in the Arctic tends to be more expensive than elsewhere. Mining projects that are viable when demand and prices are high can find it difficult to carry on when the market declines. Besides, no ore deposits last forever.

Disused mines in the Arctic have been handled differently depending on context. For a long time, it was common for mining companies to abandon their facilities after closure. One example is the coal mining community of Qullissat (1924), which in the 1960s was one of Greenland's biggest towns, with 1,400 inhabitants. In 1972, the Danish state closed the mine, evacuated the residents and simply left behind hundreds of houses,



Fig. 4. Remains of a *Folkets hus*, a meeting hall at the abandoned mining community Laver, Norrbotten, Arctic Sweden. The county administrative board of this region have attempted to turn this ghost town into a heritage site by placing signboards narrating its history. Photo: Dag Avango.

mining infrastructures and traces of life and work (Jørgensen 2017; Sejersen 2014: 44–46). In Svalbard there are similar remains of several mining communities abandoned at different times: Pyramiden (1934–1998), Grumant City/Coles Bay (1920s–1960s), Advent City (1903–1908), Hiorthamna (1917–1921), and Sveagruvan, a mine which alternately opened and closed between 1917 and 2015 (Avango 2004; Avango 2005). Abandoned mining communities can also be found in northern Sweden. Nautanen is an example of this, closed by the company AB Nautanens Kopparfält just five years after its opening in 1903 due to financial difficulties. The company evacuated the population and sold the buildings. The last resident moved away from there in 1935 (Ollikainen 2002). The remains of the town were left in the forest in the form of house foundations and traces of production. There are many similar examples from all across the Arctic area.

Not all abandoned mines have fallen into oblivion. In the mining community of Laisvall in Älvsbyn municipality, Norrbotten, Boliden mined lead ore between 1943 and 2001. After the closure, many people moved away from there, but today new actors have started using the buildings as holiday accommodation and for small businesses (Lundqvist 2016; Söderberg 2008: 49–62). This is a relatively common occurrence in closed-down mining communities in the Arctic which, inspired by the sociologist Michel Callon, can be summed up in the word *re-economization* (Çalışkan & Callon 2010). By this I mean processes by which actors attribute new values to things such as abandoned houses and infrastructures and put these material things to use for other activities than they were originally intended for. Similar examples can be found in Svalbard, at Longyearbyen, where tourist companies start hotels in former miners' dwellings. Research can be another form of re-economization, as for example in the former mining community of Ny Ålesund in Svalbard, which has been transformed into a base for scientific research stations. Today the entire mining industry of Svalbard is closing down, and both mining companies and state actors are trying to re-economize the settlements with the aid of research and tourism.

A related form of reuse has been to define mines as cultural heritage. In Norrbotten alone, to take one example, the Swedish National Heritage Board has identified a total of 78 national interests for cultural heritage management. As many as 23 of these are sites associated with mining (Riksantikvarieämbetet 1997). In addition, there are remnants



Fig. 5. Cruise ship tourists by the remains of the open pit mine for cryolite extraction at Ivittut, Greenland. In several parts of the Arctic, former mining sites are being re-economized as visitor sites for tourists. Photo: Dag Avango.

of mining that the state has defined as historic monuments and they are therefore protected under the Heritage Conservation Act. Another example is Svalbard, where the Norwegian authorities protect all remnants of human activity from the time up to 1946, which in practice means that a large share of the mining industry's abandoned towns and prospecting camps are protected as cultural heritage (Marstrander 1999). This phenomenon is less common in the North American Arctic but it does occur, for example, the remains of the gold rush in the Klondike, Yukon (Cook 2013; White 2000).

These examples are what heritage researchers such as Rodney Harrison call official cultural heritage: historical remains that have been given the status of cultural heritage because state authorities and heritage institutions have chosen to define them as such and thus to protect them by legislation, on the advice of antiquarian experts. Another type of cultural heritage process can be called unofficial (Harrison 2013). This is seen when historical remains are preserved because other actors define them as cultural heritage and worthy of protection, even though the site does not enjoy protection by law. At Rankin Inlet in Canada, some of the Inuit who previously worked in the mines have come to regard the historical remains as their cultural heritage (Cater & Keeling 2013). The Qullissat mining community in western Greenland has also come to be regarded by former inhabitants as cultural heritage. Since the 1980s, people have revisited the remains of the town, which gives an anchorage for memories of childhood and working life. Because Qullissat has been a subject of narratives about the actions of the Danish colonial power in Greenland, it has also become a resource for actors who want to mobilize support for Greenland's independence. Although the Greenland authorities do not protect Qullissat as cultural heritage, the former inhabitants do so by carefully renovating former dwellings. Other examples can be found in Svalbard, where mining companies choose to preserve older mines and mining communities even though Norwegian environmental law does not require it. The reasons for this include both economic and geopolitical considerations (Avango & Roberts 2017; Jørgensen 2017; Sørensen 2013).

In contrast, newer mines that are closed down in the Arctic are rarely subject to cultural heritage processes. A major reason is that environmental restoration has become the norm because of the environmental and mining legislation of several Arctic states (Darpö 2001; SGU 2016). Moreover, many mining companies undertake voluntarily to remediate their mining areas. For these reasons, visual traces of newer mining projects may become increasingly uncommon. One example is the Polaris zinc and lead mine, which the Canadian mining giant Cominco operated between 1982 and 2002 on Little Cornwallis Island in the northernmost part of the Canadian Arctic. After the closure, the company removed buildings and other traces of the operations. No attempts were made to attribute any cultural heritage values to the site where Polaris was located. The historian Heather Green has explained this in terms of the lack of material reference points for memories, but she has also stressed the fact that Cominco recruited almost all its labour from other areas, which meant that few people at the place had any cause to relate to the mine as cultural heritage (Green 2015). Another example is the mine of the Norwegian mining company Store Norske at Lunckefjell in Svalbard, which was ready to commence operations in 2015 but never started production due to falling coal prices. The Norwegian Government decided to close the mine completely just two years later. There was no thought of preserving anything from this mine for posterity. Instead the environment was to be restored at a cost that was then estimated at 700 million Norwegian kroner. By 2018, the cost had risen to 2.5 billion (Avango & Brugmans 2018). It remains to be seen whether the environment here will be restored.

There are several cases in the Arctic where the desire for environmental restoration has conflicted with ambitions to preserve. One example is, again, Nautanen. The National Heritage Board added the mine to the list of historic monuments in the early 1980s. A decade or so later, it was clear that waste rock tips and sand tailings were leaching about 200 kilos of copper a year into the water system—in the last century alone. One result of this is that the river downstream no longer has any fish. The municipality of Gällivare has partially rehabilitated the area in cooperation with the Boliden mining company, which transported away parts of the old waste rock piles. However, the municipality is aware that more rehabilitation is needed, but has been unable to do this because of disagreements with the landowner, the state-owned forestry company Sveaskog. This case reflects the growing importance of environmental issues in society, but also a diminishing commitment to the care of the industrial cultural heritage (Avango & Geijerstam 2015; Geijerstam & Houltz 2013).

Meanwhile, a third possible future for abandoned mining communities has appeared. At Nautanen in 2009 the Swedish Mining Inspectorate granted Boliden a permit to investigate the possibility of opening a new mine. In the following years, the company took 75 test corings in the area and estimated in 2016 that there are 9.6 million tonnes of ore with a relatively rich copper content, along with gold, silver, and the heavy metal molybdenum (Boliden 2016). If Boliden applies for and is granted an exploitation concession, the company plans to build a new underground mine, to transport the ore to Aitik for crushing and enrichment, and from there take the copper concentrate to its smelting plant at Rönnskär. What until now has been a ghost town will then once again become a component in the enormous mining system in northernmost Sweden. The cultural heritage researcher Camilla Winqvist, who is studying this re-economization, has concluded that “abandoned mining communities” are never really abandoned. From a narrow socio-economic perspective, the underground mineral deposits, whose emergence Joakim Feldman has described, are a form of latent infrastructure.

A New Arctic Mining Boom?

Boliden's plans at Nautanen are part of a global mining boom that began at the start of the twenty-first century and is continuing despite periods of slowdown. The driving force is a sharp increase in demand for metals, and the rapid economic growth in China is often singled out as a major incentive (SGU 2012; SGU 2013; SGU 2014; SGU 2018). This new mining boom has already led to major investments in prospecting and new mines. Many of these have been established in the Arctic, including mines extracting iron, gold, earth metals and precious stones in Greenland, gold and coal in Svalbard (Nilsson & Jürisoo 2015; Secher *et al.* 2008; Vikström & Högselius 2017). An example from Sweden is the Tapuli mine that the mining company Northland Resources started in Pajala municipality in 2012. The deposit had been known for over a century (at least since 1918) but no one had deemed it rich enough to justify mining until metal prices started to rise. Northland Resources went bankrupt after a couple of years, but in June 2018 Kaunis Iron resumed operations in the mine (Anselm & Haikola 2018). The mining boom has also manifested itself in the fact that established mining companies have increased production in existing mines. An example of this is LKAB's decision in the early 2000s to open new levels and new areas for mining in Kiruna and Malmberget, resulting in extensive transformations of society there.

The mining boom and its consequences have grown to become one of our hottest societal issues. Due to stricter laws and regulations in Sweden, as well as local opposition, several planned Arctic mining ventures are awaiting government decisions. Examples are Laver in Älvsbyn municipality, where Boliden wants to start a large open pit for copper extraction, and the Kallak/Gällöck project in Jokkmokk municipality, which the mining company Beowulf has been planning for a number of years. Both projects have raised concerns in the Sami communities whose reindeer grazing lands the mines are to be established in, and among residents of the area who fear that their local environment, income or lifestyle is threatened by the mines (Harnesk *et al.* 2018; Lawrence & Kløcker-Larsen 2017). Other residents pin their hopes on a better future as a result of the new mining projects, particularly in the form of new jobs, direct and indirect. Many inhabitants of Pajala were in favour of the Tapuli mine when it was started, which can be understood in the light of the fact that the municipality has lost nearly half of its inhabitants since the 1970s.

In fact, there are also actors who advocate an expansion of the mining industry based on environmental arguments. Whether the transition to renewable energy production takes place in the form of wind and solar power or through the manufacture of electric cars, it will require increased extraction of minerals such as lithium, neodymium, dysprosium, nickel and also copper. The mining industry, which has been particularly anxious to define this need, believes that the licensing of new mines must be simplified for this reason. Could this development lead to further new mines in the Arctic as well? If so, it is a huge and urgent challenge to ensure that the mining industry of the future does not place an additional burden on environments and people that are already under severe pressure from climate change. There is much to suggest that the future of the mining industry in the Arctic will not only be determined by developments in the world mineral markets, but also by the ability of the mining industry and government agencies to reach agreements with the people who are affected in different ways by mining.

NOTES

- ¹ This article is a revised and translated version of the chapter “Avtryck i landskapet. Gruvdriftens långa liv i Arktis,” in Gustafsson Reinius (ed.) (2020), pp. 130–149.

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ANNIKA E. NILSSON

Ruptures in Existence – Openings for the Future

The Need for a Different Resource Landscape

ABSTRACT Taking the once seemingly constant yet constantly moving Arctic sea ice as inspiration, this article reflects on how individuals and societies can navigate the ruptures in our expectations about a predictable future caused by climate change. With insights from scientific assessments of adaptation and resilience in the Arctic, it describes various facets of a resource landscape for addressing the challenges brought by the new reality of a warmer and more unpredictable world. In focus is the central role of people, including their learning processes and ability to cooperate. It furthermore emphasizes that futures and values are the outcome of social processes, not predetermined, and thus in the hands of those who engage in shaping them.

KEYWORDS Arctic, resilience, adaptation, transformation, resources, futures

Sea ice is moving all the time.¹ It is inherently changeable. Sometimes the interaction of winter cold, ocean currents, and winds makes the ice impenetrable. Sun, heat, and wind can cause it to rupture. Marine life thrives in the interplay between the melting ice, the flow of nutrients, and the light that penetrates the open water. In the Arctic, this interaction between ice and light has created good conditions for the hunting-based culture of the Inuit and for rich commercial fishing which provides a global market with the food resources. In the increasingly warmer world that we are moving towards, completely new patterns are being created. More ruptures are formed—unexpected cracks that directly affect the lives of people living in the Arctic, and in the long run also have global consequences. The amount of ice is steadily decreasing, no longer just because of natural variations from year to year or the whims of the weather, which have always been part of life in the polar regions (Fig. 1). The shrinking ice today reflects a fundamental shift in which a whole new landscape is emerging—a landscape in which nature’s physical expressions are changing as a consequence of ever-increasing levels of greenhouse gases in the earth’s atmosphere (AMAP 2017*d*; IPCC 2018; Meredith *et al.* In press).

The long-term effects are difficult to predict. Awareness is slowly sinking in that the relationship between the seas and humans in the Arctic is being fundamentally reshaped. It is not only about the ice and the sea or about wildlife—with polar bears becoming an iconic symbol of the changes (Breum 2018). At the local level, the shifting conditions

Arctic Sea Ice Age

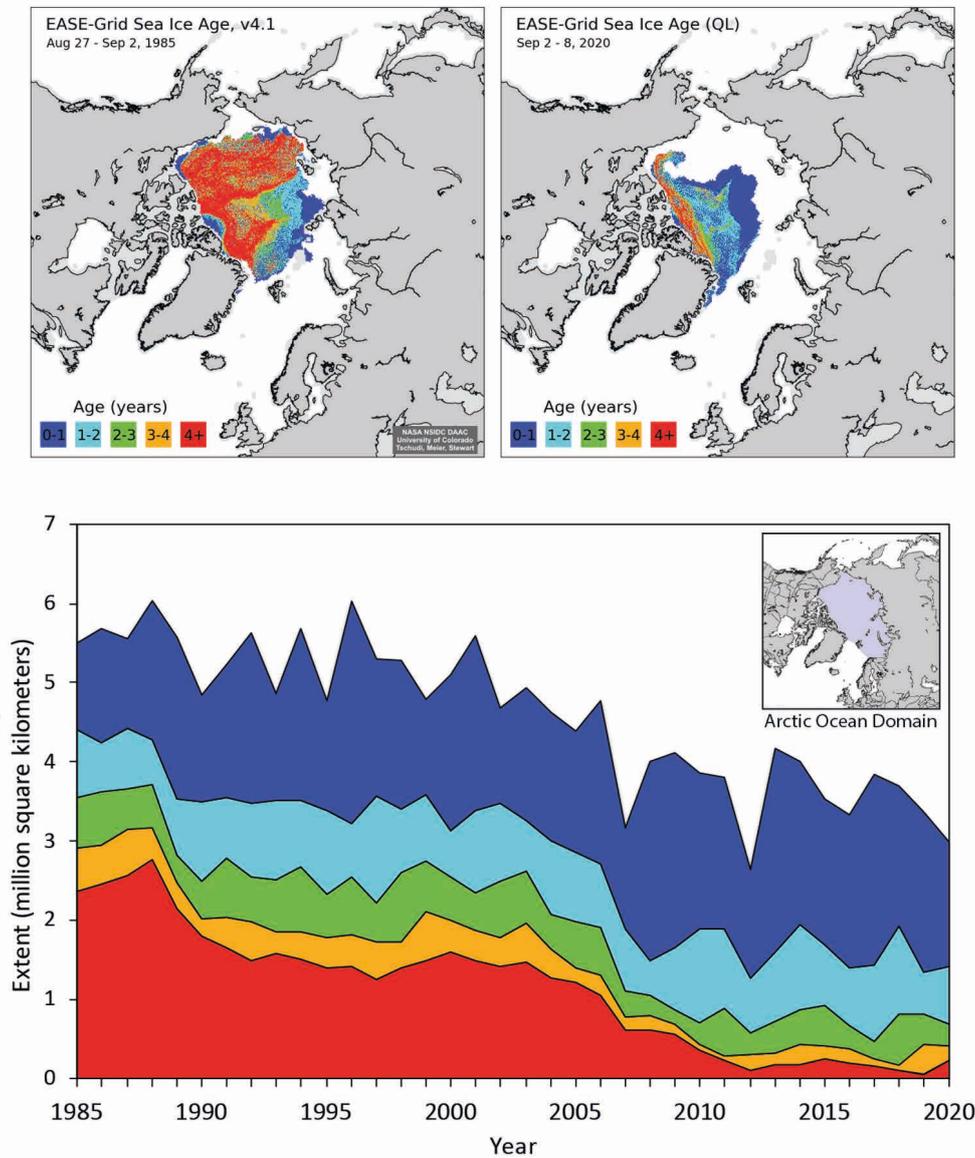


Fig. 1. The extent of the Arctic ice is decreasing by almost 13 per cent per decade. In addition to decreasing areas of sea ice, there is a loss of the older thick ice. Graphics: W. Meier, National Snow and Ice Data Center and M. Tschudi *et al.* (retrieved from <http://nsidc.org/arcticseaicenews/2020/10/>; 28 Dec. 2020).

also affect the ability of Arctic coastal peoples to make a living. When there is less sea ice there are also changes to the weather and climate far inland, which in turn reduces the opportunities for reindeer to find grazing and thus also has an impact on reindeer herders (Forbes *et al.* 2016). In international politics, several countries are now actively monitoring and asserting their national interests in the new seascape that emerges as the ice melts (Dodds & Nuttall 2016; Nilsson & Christensen 2019). Climate scientists, using satellites to follow the extent of the ice and constructing computer models, have long studied the role of sea ice in the global climate (Nilsson & Döscher 2013; Wormbs

et al. 2017). Nevertheless, for every year the sea ice seems to bring new surprises. Neither the local population nor shipping can rely any longer on past experience. Anyone who is dependent on the ice must be prepared for surprises that go beyond human experience and today's knowledge. Since the Arctic ice affects the global climate, this is ultimately a concern for people anywhere in the world.

Research on *Resilience*

Not being able to rely on past experience of weather and nature is a realization that has begun to make an imprint on people's lives all over the world. The ability to deal with change is sometimes called *resilience* and also discussed in the context of societies' ability to adapt to climate change, as elaborated in several reports from the Arctic Council (AMAP 2017a; AMAP 2017b; AMAP 2017c; Arctic Council 2016). This research is about understanding and navigating the dynamics of climate change and its pervasive consequences. Regardless of where we live, the challenge concerns how various processes of change are interlocked, how they make it difficult to plan for the future, and how we—individually and collectively—must nevertheless be able to build a foundation that ensures that new ruptures become openings instead of abysses.

Over the past 10,000 years, a relatively stable climate has created the basic conditions for how people today live their lives in relation to nature and to other people. Now conditions are changing, and the future that is being renegotiated also raises questions about the norms established in different circumstances. How are we to manage the interplay between the conditions shaped by new landscapes and by the interpersonal relationships and institutions that govern our societies? Society's dynamics can be much more sluggish than the ice, not least when it comes to worldviews and power relations. Slow social change can sometimes give a sense of security; we know what to expect and we have a foundation to stand on when a storm comes. The question is whether today's institutions can withstand the power of the new storms that await us, whether the norms and expectations that have facilitated interaction under other conditions, between individuals and between countries, can still fulfil their function, or whether we too must start thinking in new ways. The Arctic Council has played a key role since the 1990s in peaceful cooperation between countries in the Arctic region, but in recent years the discussions have been increasingly affected by the same political tensions and disagreements between national interests that are seen in other parts of the world. Consensus can no longer be taken for granted (Gulliksen Tømmerbakke & Breum 2019). In research on international relations, the interest in cooperation, which emerged in the 1990s, is being replaced by an increasingly clear focus on geopolitics and conflicting interests (Dodds & Nuttall 2016; Nilsson & Christensen 2019; Poelzer & Wilson 2014; Tamnes & Offerdal [eds.] 2016; Wegge & Keil 2018).

When the future opens in unexpected directions, different actors search for and assert their positions, not least by formulating visions of the future. The Arctic has often served as a projection surface for hopes of lucrative opportunities, and now the newly opened sea once again appears attractive for commercial activities (Wormbs [ed.] 2018). The narratives in these visions serve to shape the Arctic resource landscape of the future. Such narratives can also affect what we pay attention to and value (Avango *et al.* 2013; Bridge 2009). Judging by news coverage in both English-language and Russian media, oil and gas under the continental shelf are among the most important assets in the Arctic (Nilsson & Christensen 2019). Climate scientists talk instead about the ability of ice to reflect solar energy and cool the earth as a planetary resource that we are on the verge of losing. For others again, not least tourists who make a kind of pilgrimages to the

north, the value of the Arctic environment often lies in the beauty of the landscape and perhaps in the possibility of encountering some iconic animals. After following research on pollution, climate change and human conditions in the Arctic for a couple of decades, first as a science journalist and later as a social scientist with an interest in Arctic politics, visions of the future, and climate adaptation, I have begun to think about resources in a different way. The most important resource in a rapidly changing landscape is people's ability to work together to create the conditions for dealing with surprises and coping with a future that is difficult to predict.

The Complexity of Change

The changes in the Arctic are rapid and taking place significantly faster than scientists envisaged just a few years ago (AMAP 2017*d*). In addition to a warmer climate and new weather patterns, the Arctic is facing pressure from a number of other changes, where historic development and long-term processes interact with the new dynamics (Hovelsrud & Amundsen 2017). Large-scale resource extraction has a long history in parts of the Arctic, as described in more detail in Dag Avango's contribution to this special issue. With rising global demand for raw materials, there is increasing pressure to open new mines and drill for oil in new areas. New infrastructure in the form of railways, roads, ports, and fibre cable reduces distances between the Arctic and the rest of the world. A historical example of the potentially transformative role of new infrastructure is the railway between the mines in Kiruna and Malmberget with the ports of Narvik and Luleå. This new connection opened parts of Arctic Sweden to industrial development, leading to shifts in regional economic structures, demography, and livelihoods, in addition to the impacts on the landscape. Today there are discussions about a railway linking Finland to the port of Kirkenes on the Norwegian-Russian border, thus connecting Europe with the Arctic Ocean (Arctic Corridor n.d.). The Arctic is becoming increasingly accessible. In recent years, tourism has grown at a record pace, although this growth shows an uneven geographical distribution. Iceland has become one of the major tourist magnets, where tourism in 2018 accounted for over 40 per cent of the export value, thereby contributing more to the economy than fisheries and manufacturing (Óladóttir 2018). The booming tourism has also sparked debate. Environmental organizations have stressed the need for regulations to protect sensitive nature, and Sami voices emphasize that tourism must not be allowed to grow at the expense of their livelihood and their rights. Researchers have also begun to draw attention to the negative sides of mass tourism (see, for example, Hale 2018). Whereas tourism used to be described as an alternative to mining and heavy industry, bringing economic growth and jobs, voices are now being raised that question the long-term sustainability of tourism (Mullis 2017; Saarinen & Varnajot 2019). The COVID-19 pandemic has also shown the vulnerability of the Arctic tourism industry and the local economies that rely on it.

The Arctic has also become part of world politics. Twenty years ago, few would have predicted that China would have interests in the Arctic. Today this is taken for granted, and countries even further south in Asia are looking to the north. In the Arctic Council the number of states with observer status has grown.² During the Cold War the Arctic, as Kirsten Hastrup describes in her contribution, was an arena for the arms race, and although leading political actors today take pains to emphasize the consensus for peace and cooperation in the region, military rearmament is plain to be seen (Wezeman 2016).

Computer models simulating future climate can provide an overall picture of changes in temperature, precipitation, and the extent of the ice in a hundred-year perspective.³ In practice, however, it is difficult to imagine what the world will look like in as short a time as a few decades, because the changes also concern society, globally as well as locally. The unpredictability becomes apparent when you look back in time, with major political upheavals in recent years, and with COVID-19 pandemic, but also when we as scientists, in dialogue with local actors in the Arctic, have tried to create scenarios about how the future might turn out. A few years ago, in workshops conducted for the research project Mistra Arctic Sustainable Development and an assessment of adaptation action in the Arctic, we asked local and regional actors in the Nordic Arctic about what changes they see as most important from a local perspective and what changes they perceive as the most difficult to predict (Nilsson *et al.* 2017; AMAP 2017b). Responses varied depending on the local economy and geography, but there were some recurrent themes. One example concerns who will desire to live in rural areas and small towns in the future; whether there can be vibrant local communities when young people move to cities in search of education and work. Another recurring theme concerns the dependence on local natural resources, both the availability of these in the future and the question of whether there will be a market where they can be sold. A third theme concerns the local community's ability to have a voice in political decisions that govern the conditions for the development of the area.

The picture that emerged from these conversations allows us to see climate change in a wider societal perspective. We know, thanks to solid research, that the climate will change in coming decades, but both individuals and communities still face a situation where it is impossible to predict exactly which effects these changes will have on weather, landscapes, and society. The challenges that we—and the generations after us—will face are shaped in complex interactions that affect both the impact of the climate on individual people's choices and how the consequences of different political currents are translated into action. No one knows for sure what resources will be needed to ensure a good life in the future.

The media debate about Arctic resources is, as we have seen, mostly about oil and gas or about various minerals that can be extracted from the earth's crust—finite natural resources that have played and still play a key role in today's material welfare. The rich fisheries are also sometimes mentioned, either as a key resource locally for many coastal communities or as a factor in the national economy of Greenland, Iceland, and Norway. In some parts of the Arctic, forests are an important asset. Another feature of the Arctic that has attracted investment and economic interests is the supply of flowing water and wind, energy that can be captured by hydroelectric power stations and wind turbines.

Although food, energy, and materials for buildings and infrastructure are crucial for ensuring a good life, the resource landscape of the future may ultimately concern a completely different kind of resource: people's ability and willingness to work together and to learn new things. People themselves are a key resource. The rapid changes that have begun to appear as the earth becomes warmer make great demands of the ability of individuals, groups, and entire societies to *solve problems together*. Apart from the fact that we need to find ways that lead away from the fossil dependence that causes climate change, we will have to *adapt* to the effects of climate change that are already inevitable. In addition to this, there is the increasing unpredictability of how a warmer climate will affect us in everyday life. The situation requires us to tackle new questions: What are we going to plan for? What is most important in our lives? Whether it is the Arctic or

some other part of the world, the question of resources becomes much broader than just a matter of raw materials and energy: What resources do we need to *create* to cope with the challenges that an unpredictable future might bring?

Figs. 2–3. Humans and their ability to make the world comprehensible, and to solve problems along with others, are a key resource in a changing world. In the exhibit “The Arctic—While the Ice Is Melting” at Nordiska museet in Stockholm, the original graphic from the Arctic Resilience Report was used as inspiration for a woven installation, where the mere act of weaving further emphasizes the dynamic nature of adaptive capacity.

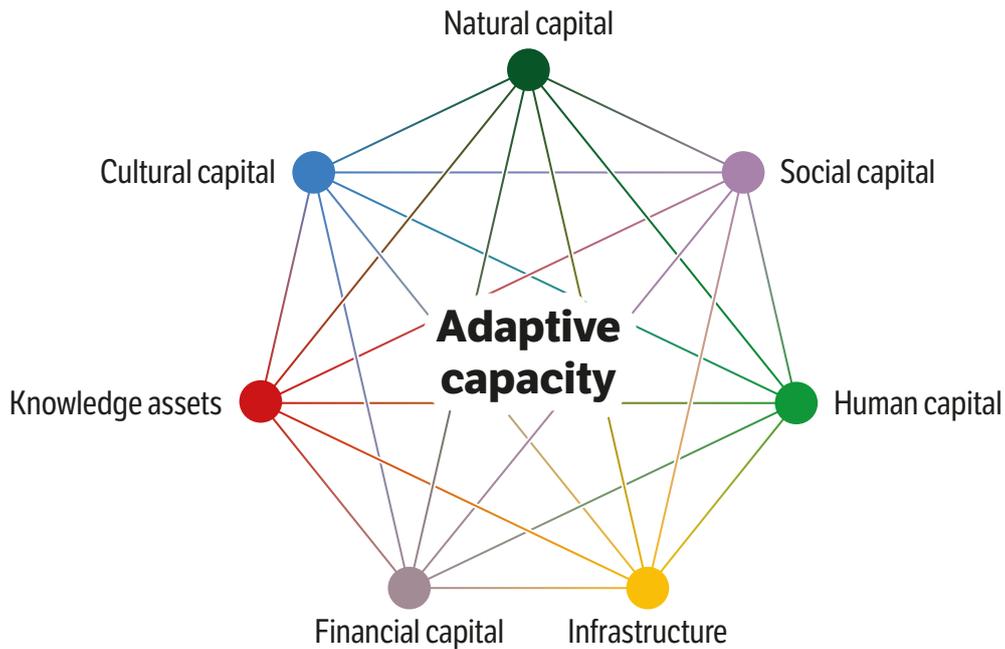


Fig. 2. Graphic: Hugo Ahlenius, Nordpil, reproduced from Arctic Resilience Report (Arctic Council 2016).

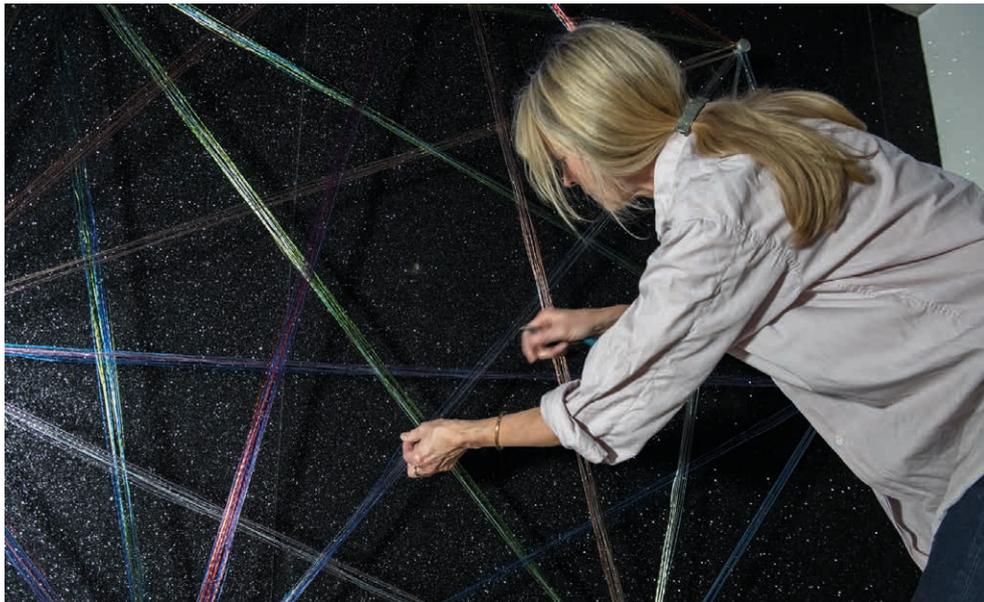


Fig. 3. Model installed in exhibition by Johanna Thelander. Photo: Karolina Kristensson, Nordiska museet 2019.

The Resource Landscape of the Future

Climate change has led to a growing interest in questions about the ability of societies to adapt. Assembled insights and results of research on climate adaptation and resilience in the Arctic indicate some decisive factors to prevent new conditions and surprises from leading to crisis (Kofinas *et al.* 2013; Nilsson *et al.* 2016). Taken together, they outline what I have chosen to call *the resource landscape of the future*. It is a multifaceted landscape. To clarify that it is a whole consisting of parts which must interact in order to strengthen our ability to deal with a rapidly changing world, they can also be described as the facets of a prism. Just as today's landscape has been shaped by decisions and actions in the past, so the decisions taken now and in the immediate future will in turn affect the resource landscape of future generations. This urges us to assume responsibility, both individually and collectively, so that resources are not eroded but actively strengthened. The resources of this landscape are illustrated in Fig. 2 and described in more detail below.

Humans are often portrayed as a threat to nature, and the climate change that the earth is now undergoing is undeniably the result of how people have chosen to live their lives. Kyrre Kverndokk's contribution discusses in greater detail how a growing awareness of this is expressed, among other things, in the increasingly common designation of our era as the *Anthropocene*. At the same time, I would argue that the individual person and people together are also the single most important resource to meet the new challenges we face. People possess knowledge, skills, and life experience. Representatives of companies and states sometimes talk about investing in human capital as a way to boost growth, but there are also traditions that emphasize the central role of humankind as the steward of a legacy to be passed on to future generations. This outlook, underpinned with ethical rather than economic arguments, has, for example, been highlighted in Arctic research into biodiversity (Chapin *et al.* 2015).

As mentioned earlier, polar bears have long dominated the image of the Arctic. Is this an expression of an ideal picture of the Arctic as a huge nature reserve without humans? Yet, people have lived in different parts of the Arctic for several thousand years, and they still do. The societies and survival strategies that Kirsten Hastrup writes about in her contribution on life with the ice in Greenland provide examples of both change and continuity. In recent years, the rights of Arctic indigenous peoples have been given ever stronger protection in international law (Bankes & Koivurova 2014). The experiences and specific knowledge of Arctic peoples concerning the environment and living conditions have also gained increasing attention and are held up as vital also outside of the immediate context. Local observations of what is happening in the north are essential if the rest of the world is to understand what climate change can mean for humans and nature.

Collaboration is based on a great many interwoven and overlapping social networks. Who can extend a hand when you are in need? Who has knowledge to share with others? Who can give meaning to life and generate inspiration to find new ways when old habits are no longer fit for purpose? At least as important as the links between individuals are the societal processes that create common expectations and norms, even when we disagree on individual issues. These structures have been built over time to create trust in the community even when not everyone knows each other. We are all part of political systems at local, national, or international level, and these are often based on trust in democratic processes. When this trust is undermined, it becomes more difficult to cooperate and make decisions that take everyone's wellbeing into account, including future generations, and that do not just bring short-term benefit for some individuals.

Today's major political challenges stem from the fact that in matters large and small, from planetary to local or individual, there are often clashes when it comes to long-term risks and benefits versus immediate interests. Many of the changes that characterize today's societies around the world derive from systems that are global. The earth's climate is an example, but there are also the markets for raw materials and money. At the same time, it is often easier to create trust in small-scale, local contexts or within national borders, where shared interests are more obvious and where fundamental values have in many cases been shaped by a common past. Effective cooperation to meet changes and surprises will require us to simultaneously consider the global and the local, the individual and society. Otherwise, there is a risk that both politicians and individuals will make decisions on erroneous grounds.

Knowledge is another central resource. It often refers to facts about the world as we understand it today. But the world is constantly changing, which means that some knowledge quickly becomes outdated. Old textbooks or scientific articles about sea ice in the Arctic could easily be misleading, not because there was anything wrong with the texts when they were written but because the world has changed so quickly. Instead of viewing knowledge as static, it is therefore more useful to see both knowledge-making and learning as social processes. Such processes, together with our experiences, also shape what we regard as facts. In a changing world, the demands on our ability to quickly perceive and analyse the surrounding world increase, as do the importance of social contexts where proven experience can meet new insights and where it is possible to listen and learn from others. A society's ability to adapt to change may depend on the existence of forums where people with different types of knowledge can meet: the knowledge accumulated in different scientific disciplines, experience-based and local knowledge of the specific conditions that prevail in a particular place, and the knowledge possessed by those who practise a particular activity.

The opportunity to gain knowledge of what is happening in the Arctic has never been greater than today. Since political cooperation began in the Arctic in the 1990s, first on environmental issues and research and then through the establishment of the Arctic Council in 1996, countless scientific reports have been published, the findings of which are often summarized and spread in popular form to a larger audience. During the International Polar Year 2007/2008, major investments were made both in basic new research with scientific fieldwork and in reaching out more with results and interpretations. Some of the initiatives taken during the Polar Year have become a permanent part of the information flow. For example, those interested in sea ice can get new reports every month and also follow how scientists reason about the results.⁴ In addition, more is reported about the Arctic in the media, whose interest in the region has increased after the sea ice began to disappear at an accelerating pace (Christensen 2013). In Swedish newspapers too, Arctic matters have gained more space in recent years when the rapid melting of the ice has become apparent (Christensen 2013). Experiences from the Arctic also appear in film and music, and on a large scale through Nordiska museet's exhibition "The Arctic—While the Ice Is Melting." The great challenge for those who are interested is rather to sift the information and critically evaluate it: Why do some images and narratives get a lot of space? What knowledge or experience is *not* visible in the news flow or in the range of culture on offer?

Culture is not always mentioned in the academic discussion of what creates the conditions for climate adaptation, but in the conversation about the future of the Arctic it has been highlighted as a central factor, with the focus on indigenous peoples' experience-based knowledge and views of the relationship between humans and nature

(Kofinas *et al.* 2013). Misguided attempts during the colonization of the Arctic to shape all people according to the norms of the colonizing society damaged processes related to sharing traditional and local knowledge across generations. This applies not least to the reservoir of experience that was integrated in the linguistic diversity. But there are also positive trends in cultural and linguistic renewal (Schweitzer *et al.* 2014). Moreover, in the past decade, more and more knowledge processes have started to make room for dialogue between science and indigenous peoples' knowledge and culture, not least concerning climate change.⁵ The short documentary films shown in Nordiska museet's exhibition include additional projects based on collaboration between scientists and people with expert local knowledge: from north western Greenland where anthropologists, biologists, and local hunters worked together exploring new waterways and other effects of warming (Andersen *et al.* 2017), and the collaboration on measuring glaciers and studying warming that is being developed between reindeer herders in the Laevas Sami community and climate research at Stockholm University's research station Tarfala (Rosqvist 2020: 186–187; Inga 2020: 194–196).

Culture in its diverse forms also plays a central role as a tool for existential and ethical problems. We are all faced with questions where knowledge in a narrow sense is not sufficient to provide us with a basis for decisions: What is valuable for a good life? How should we prioritize when it is not possible to satisfy all desires and needs? What does nature mean to people and communities?

Nature in the form of the physical attributes of landscapes and ecosystems with their diversity of organisms plays a key role in producing food and materials, but also in regulating the climate, ensuring the availability of clean water and in many cases for recreation and for people's identity. In the discussion of human dependence on ecological processes, concepts such as ecosystem services and natural capital occur. There have also been attempts to estimate the economic value of ecological processes, although not everything can be measured in money (Kumar [ed.] 2012; for examples from the Arctic of applications and critique, see CAFF 2015). An environmental economist has calculated that the overall global climate benefit of the ability of sea ice to reflect solar energy and of the Arctic soil to absorb the climate gas methane is ten times greater than all the oil and gas in the region (O'Garra 2017).

Estimates of economic values are based on how a resource is valued on the market (how much someone is willing to pay), sometimes affected by guidelines that have been decided by political assemblies. An example of the latter is that the EU has created a market for carbon dioxide emissions to stimulate a reduction. But the economic value that is ascribed to various resources is not given by any laws of nature; it depends on priorities and choices in a social context as well as on who has the opportunity to make their voice heard in the market and in politics. Economic value can therefore be a dubious measure of the overall benefit to society, not least when we have to think ahead in time and also take into account the welfare and priorities of future generations, which we can only guess at today. Moreover, calculations of the value of ecosystem services do not capture values other than purely economic ones. Despite their shortcomings, calculations of ecosystem services and their values can be important for revealing matters that are otherwise easily overlooked. Perhaps the strength of concepts such as *natural capital* and *ecosystem services* is primarily rhetorical, in that they use a language that tends to have a greater political impact than references to spiritual, emotional, and ethical values. These concepts also draw attention to the fact that many basic human needs are entirely dependent on processes in landscapes and ecosystems. Today, many

of the roles that nature plays for people's well-being are being eroded. This happens when we pollute land and water so that they can no longer help to provide us with food. It happens when chemicals kill the bees that pollinate fields, berry bushes and fruit trees. And it happens when a warmer world creates an Arctic that can no longer play the role of earth's refrigerator.

Fortunately, there are also measures that can contribute to well-functioning ecosystems and where the role of humans as *stewards* becomes central. In a rapidly changing world, however, that role is far from simple. It requires long-term planning in a situation of uncertainty about the conditions that may prevail, even in the near future. Resilience research often highlights diversity in biology, culture, and knowledge as means to secure the broad resource base that is particularly important when the surrounding world changes. In the short term, preserving such diversity can be perceived as a cost or a restriction, for example when policy decisions protect certain areas from development (see for example Carson & Sommerkorn 2017). Given that the findings and messages of climate research show that a radical societal transition is needed to limit the earth's warming, many people believe that we are in a situation where national and individual interests sometimes need to be set aside in favour of joint responsibility. Basically, it is a question of what risks we want to take and at what price. At the same time, we need an open discussion about who should make decisions and how they should be made. To what extent are those exposed to the greatest risks also included in the decision making? The difficult questions require not only knowledge of the systems to be managed, but also open conversations about priorities, fairness, and objectives. It concerns the perspectives that need to be included in conversations about how nature and society interact in what are sometimes referred to as *social-ecological systems* (Sommerkorn *et al.* 2013). Climate research has in recent years become increasingly multidisciplinary, with strong elements of social sciences and humanities, and played a part in putting issues like these on the agenda (Berkes *et al.* 2003).

To a large extent, today's social-ecological systems also involve the *infrastructure* that helps provide people with food, water, energy, and opportunities to communicate with the surrounding world. The role of the infrastructure comprises the technical hardware in the form of bridges, roads, railways, fibre cables, and water pipes, but also the social structures required for this technology to function, as well as laws and structures for ownership and management. In this broader sense, the infrastructure often goes hand in hand with the public institutions that make decisions on behalf of everybody. Investments in infrastructure are often expensive, which is why the infrastructure is often substandard in sparsely populated parts of the world, as in the Arctic, where the investments are also rendered more expensive by large distances and demanding natural and climatic conditions. Infrastructure expansions have often been justified by industrial interests in Arctic natural resources and driven by economic forces. In Sweden, for example, the development of the railway in the north went hand in hand with the mining industry (Sörlin 1988). In Russia, Alaska, and Canada, the need to transport fossil resources to southern markets has played an important role. Now there is increasing investment in infrastructure to facilitate shipping and to link northern areas to the Internet as well.

The relationship of infrastructure to a changed climate is complex. If communication between people and the transport of goods is facilitated in areas with great distances, this can contribute to a greater ability to cope with change and surprises. At the same time, insensitive infrastructure placement can harm existing ecosystems and reduce freedom of movement for humans and animals, which can instead erode the capacity for

adaptation. For example, the Sami and their reindeer need migration routes and pastures, but this has often conflicted with new infrastructure projects, from the construction of hydroelectric power stations in the first half of the century to today's need for wind power and new roads for mining transports.

The infrastructure itself is sensitive to climate change and has often been dimensioned according to historical climate conditions. Even if one builds with a margin for occasional extreme events, there is a high risk that weather events that are now perceived as exceptional will become more common in a warmer world. Examples include torrential rain undermining roads and railways, heatwaves that are too extreme for cooling systems in hospitals and industry, or large amounts of snow which must be handled with inadequate resources. In areas with melting permafrost, the challenges are even greater, since land that was previously frozen all the year round is now thawing to ever greater depths and therefore no longer provides a firm foundation for buildings, roads, and railways (Hjort *et al.* 2018).

Financial capital is a prerequisite for making the necessary investments, whether in infrastructure, knowledge, or new collaborations. The availability of money in the bank or the possibility of borrowing is central both for adaptation and for renewal. In the Arctic, financial muscle has often been linked to industry and investment has therefore followed the needs and priorities of industry. One issue for local communities facing new industrial establishments is the extent to which local people and municipal politicians can participate in steering investments. It is becoming more and more common to see agreements in which companies which over and above their other priorities make deals to finance investments that can help develop the local community in order to secure social acceptance for industrial development. A broader question concerns who is to pay for investments that do not yield any financial returns, at least not in the short term, but which can be crucial to people's livelihood and quality of life. How do we ensure that today's financial investment contributes to long-term sustainability, according to the UN's Sustainable Development Goals, rather than only stressing economic returns? At the same time, global sustainability objectives need to be translated and supplemented so that they become relevant in every unique local situation.

A Web of Resources and Dependencies

Placing emphasis on the potential for adaptation and renewal in the face of an uncertain future conjures up a different picture of the Arctic as a resource landscape than when we talk solely about natural resources. The focus shifts to people's ability, individually and together, to prepare themselves for new circumstances and climate-related surprises. It is important not to stare blindly at one aspect at a time, but to see the facets considered here as part of a whole. To be able to contribute to a general capacity to adopt new challenges, these aspects are mutually dependent: people, cooperation, knowledge, culture, nature, infrastructure, and financial capital. They are not interchangeable entities. As previously discussed, one can calculate the value of specific aspects of nature for human well-being in economic terms, but unlike money, one ecosystem service cannot be freely replaced with another. Nor can people's inventiveness be replaced by a productive ecosystem or a functioning political structure for making shared decisions.

The increasing scientific interest in the interaction between ecological and societal processes from a system perspective has led to a focus on new issues. For example, *resilience* research has highlighted how many separate small changes together can make an entire system sensitive even to an isolated moderate shock (for an overall presentation

of the resilience concept, see Walker & Salt 2006; Folke *et al.* 2010). In the worst case, the shock can cause the whole system to change character and get stuck in a new dynamic, which may not be as favourable to humans. Scientists talk of this in terms of *tipping points*. Today there is a growing awareness that sea ice may disappear completely from the Arctic during the summer months, which in turn may lead to a fundamental change in how the global climate system works (Peterson & Rocha 2016; Wassmann & Lenton 2012). This would also profoundly change the Arctic societies whose everyday life, livelihood, and culture are intimately intertwined with hunting which in turn depends on the ice, or with reindeer herding which is dependent on the availability of lichen and land on which to move. These changes have even been described in terms of threats to the existence and fundamental rights of indigenous peoples (Watt-Cloutier 2015). But climate change will also affect life in larger communities and cities, the conditions for transports across land and sea, and economic activities such as industry and winter tourism.

At the same time, the system perspective has been criticized for being blind to the ability of humans to make decisions and choose direction; the future may seem predetermined and guided throughout by forces beyond people's influence (for a summary of the debate see Carson & Sommerkorn 2016). Yet research based on studies of Arctic communities shows that a society's ability to make decisions locally is crucial for preventing local social-ecological systems from shifting character in an unwanted direction (Huitric *et al.* 2016). But if that foundation—the opportunity to control one's future—is also eroded, perhaps only a little nudge is needed before the undermined ground collapses. Diversity, as discussed in the context of knowledge processes, is another key word in resilience research. Since we cannot know in advance what knowledge, which social networks or natural resources may be decisive for dealing with future challenges, the presence of different perspectives needs to be facilitated and secured.

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Ruptures in the ice are a warning that climate change is creating completely new conditions for life in the Arctic. We are reminded that both nature and societies are in constant motion and that we cannot take the world of today for granted. But new ruptures not only create new conditions but also an opportunity for new openings. Although we know that the earth will grow warmer, we cannot know in detail what challenges people and societies will face even within as short a time as twenty to thirty years, when the children born now have grown up and perhaps have children of their own. On the other hand, it is possible for the vast majority to help strengthen one or more of the characteristics, the facets of the prism sketched here, that together enable communities and ecosystems to cope with rapid changes and surprises.

NOTES

¹ This article is a revised and translated version of the chapter "Sprickor och öppningar. Arktis och framtidens resurser" ['Cracks and openings. The Arctic and the resources of the future'], in Gustafsson Reinius (ed.) (2020), pp. 252–269.

² For a current list of Arctic Council observers, see <https://arctic-council.org/index.php/en/about-us/arctic-council/observers>; access date 28 Dec. 2020.

³ For more information about how models contribute to knowledge about sea ice: <https://nsidc.org/cryosphere/seaice/study/modeling.html>; access date 28 Dec. 2020.

- ⁴ Read more on the website of the National Snow and Ice Data Center: <https://nsidc.org/>; access date 28 Dec. 2020.
- ⁵ See, for example, the project “Exchange of Local Observations and Knowledge of the Arctic;” <http://eloka-arctic.org>; access date 28 Dec. 2020. Another example is the work of the Arctic Council on climate adaptation, as presented in three reports: *Adaptation Actions for a Changing Arctic. Perspectives from the Barents Area*; *Adaptation Actions for a Changing Arctic. Perspectives from the Baffin Bay/Davis Strait Region*; *Adaptation Actions for a Changing Arctic. Perspectives from the Bering-Chukchi-Beaufort Region* (AMAP 2017a; 2017b; 2017c).

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Reviews

Coppélie Cocq & Thomas A. DuBois, *Sámi Media and Indigenous Agency in the Arctic North*, Seattle: University of Washington Press 2020, ISBN 9780295746609, 334 pp.

An innovative addition to literature on Sami media can be found in the book *Sámi Media and Indigenous Agency in the Arctic North*, by Coppélie Cocq and Thomas A. DuBois (2020). This publication gives the reader a thorough insight into how the media field, communication and digital development have developed in Sápmi. The book has a clear decolonizing ambition which is evident from, among other things, the framing of the content. An example of this is that the chapters are named after words in the various Sami languages denoting different forms of snow. In an unassuming manner, the reader is guided into the book through the language of symbolism, where the writing of history is woven together with the snow as a carrier of meaning. For instance, one of the chapters is named after the Lule Sami word for fresh snow, *áppás*, which in this context symbolizes early established organizational development. Another chapter is named after the Ume Sami word *ruövddietjarvva*, 'snow with a hard crust capable of withstanding weight of a large animal like a moose or horse,' which in this book is given meaning through descriptions of well-established, strong and effective communication methods through digital technology.

The book portrays how Sami cultural struggle, resistance and cooperation have developed over time. In an easily accessible way, it describes how the Sami organizational movement has been based on interaction between the Sami people on different sides of national borders in Sápmi and found strength through collaboration at the local, national and international level, as well as through joint resistance to colonial structures of varying kinds. Throughout the book, explanations of the main features of Sami history are presented in relation to cultural communication practices, primarily during the twentieth century. A number of leading figures are presented through the unfolding of their ambitions to spread knowledge about Sami culture, both within and outside the Sami community, thereby creating space for capacity building and self-determination. The reader is given the opportunity to take part in critically crucial historical events that have affected the Sami people's opportunities to make their voices heard, both in history and today. Examples include the well-known Alta conflict, the establishment of the Sami Council and Sami involvement in, and influence over, international indigenous politics. The authors describe a process of Sami awakening, where pride in their own culture has grown over time and is now very strong.

The book alternates between presenting general developments in broad brushstrokes and providing the reader with detailed descriptions of selected individuals, artists and cultural carriers who, in various ways, have been, and still are, important to Sami society. Sami voices emerge throughout the text, for instance in quotes from poems, lyrics and interviews reproduced in the original Sami language with English translations. The importance of new technology and social media is described, placing the Sami in the forefront of establishing new community-based communication strategies via the Internet.

The Sami voices presented in the book are of course those that have appeared in different contexts for a long time. However, in light of the fact that political developments in Sápmi have largely determined who is to be regarded as a “genuine Sami,” some questions come to mind: Which voices are not heard? Which voices have been silenced? And what determines which Sami voices may or can appear in communication practices, both in history and today? This applies to language, as well as to issues related to culture and identity. A problematization of these issues would have been both interesting and desirable.

The book is a historical chronological description of Sami networking and organization viewed from a cultural perspective in an ever-growing digital existence. It works very well as an overview, an introduction to Sami history, as well as to topics such as digitization, social media and communication in an indigenous context. It is a portrayal of how events, strategies and culture are interrelated on several different levels; between indigenous peoples around the world, between majorities and minorities, between history and the present and, not least, between traditional and modern Sami society. Its form and content are both historically rooted and aesthetically pleasing. Above all, the book is a respectful narrative about, and a tribute to, those who struggled before us, who paved the way, and created the tracks in the snow for the rest of us to follow.

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Anna Lena Deeg, *Die Insel in der nordgermanischen Mythologie*, München: Herbert Utz Verlag 2016 (Münchner Nordistische Studien 23), ISBN 9783831645077, 256 pp.

The book is an investigation into the various aspects of the “island” in Scandinavian mythology. In the introductory chapter, the author addresses the general concept of “insularity” and discusses the island both as a poetic space (*poetischer Raum*) and as a mythical space (*mytischer Raum*). This theorizing, which in itself is interesting, contributes less to the understanding of the main subject matter, however.

The source material is extensive and diverse and to handle it in a reasonable way, the author makes a thematic arrangement. We thus get four principal sections each with its own topic. The first one, denoted “Inseln des Wartens,” deals with two different myths, on one hand the story about the battle of the Hjaðningar, and on the other, the binding of the Fenris Wolf on the island of Lyngvi. The first myth has the struggle between Heðinn (of the Hjaðninga family) and Högni go on until Ragnarök. The author traces a trend to localize the place of the Hjaðningar battle in the real world, from a vaguely imagined island in the *Ragnarsdrápa* to different islands of the North Atlantic in *Skáldskaparmál* or of the Baltic in *Gesta Danorum*. Saxo points out *Hithinsø*, present-day Hiddensee at Rügen, whereas Snorri and the *Sqrla þátrr* prefer Hoy (ON *Háey*), one of the Orkney islands.

The binding of the Fenris Wolf is clearly localized to an island called *Lyngvi* which is situated in a lake with dark water, the *Ámsvartnir* (*Gylfaginning* Ch. 34). Neither name is attested elsewhere. I do not quite agree with the author's interpretation that this localization and the names should wholly be ascribed to Snorri's imagination. It is probable that he found something similar in the oral tradition which he then further embroidered.

The imprisonment and revenge of the smith Volund offers the theme of the second section. The main source, the *Völundarkviða*, sets this in a place called *sævar stöð* which is interpreted by the prose lines as an islet, *hólmr*, situated in front of the mainland (*fyrir landi*) and treated as a proprium, *Sævarstaðr*. The author argues that this islet is affected by the tide, it can be reached by foot at ebb and be inaccessible at flood. The sons of King Niðuðr thus walk onto the island where they are killed by Volund; the flood prevents them from escaping. The interpretation is attractive but presupposes specific meanings of some words occurring in the story. The verb *ganga* would be used in the sense of 'walk,' so in stanza 28 *grátandi Þøðvildir gekk ór eyu*, but *ganga* here could simply mean that she 'went from' the island irrespective of the way it happened. The term *ogurstund*, a hapax legomenon of disputed meaning, would refer to the period of high tide which prevented visitors to the island from returning by walking. For this, the author refers to Ursula Dronke (1997) who bases her interpretation on the Old English term *ēagor/ēgor* 'flood, high tide' which would be related to Old Norse *ogur*. However, the word *ogurstund* may here mean no more than a 'short hour' (Sveinbjörn Egilsson 1860; Kristjánsson & Ólason 2014).

The well-known phenomenon of the duel on an island (ON *holmganga*) is analyzed in the third section. The Icelandic family sagas of the thirteenth century provide the literary descriptions of the duel. The problem is to know to what extent this source material reflects the reality of the *holmgang* duel in the ninth to the eleventh centuries. The author seems to take the historical value of the sagas' descriptions for granted. Her analysis of the duels between Thor and Hrungrnir, and Heimdallr and Loki, respectively discovers traces of the *holmgang* also in the mythology. Similarly, the statement of *Fáfnismál* (14–15) placing the final battle in Ragnarök on the island Óskopnir leads the author to interpret the field *Vígríðr* with its demarcation indications ("a hundred miles in every direction") as being situated on an island. This field will be the scene of the last battle of the gods and their enemies according to *Vafþrúðnismál* stanza 18. In my view, the space indications are primarily intended to show the large extension of the future battlefield. Interestingly, the *holmgang* is associated with a double place delimitation. First its performance on an island, and second a small spot on that island marked out by hazel rods (cf. *Kórmaks saga* Ch. 10).

The contents of the fourth section, finally, are made up by the traditions about the creation of the earth and of two large islands in the Baltic, Sjölland and Gotland. The cover of the book shows a satellite photo of the island of Gotland. Surprisingly, the author introduces this section by an overview of the post-glacial development of the Baltic. This is not without relevance when comparing with the emergence myths of the two islands mentioned. Gotland actually rose out of the sea as the author remarks. The creation of the earth as told in *Völuspá* and *Gylfaginning* presents some differences which the author tries to reconcile and bring back to a common version. Following *Gylfaginning* the earth was shaped from the giant Ymir's body and the sea from his blood, and this concept was also that of *Völuspá*, the author argues. I am not quite convinced of this; rather, we have to do with two different variants, but I agree with her statement that both texts imagine

the earth as an island surrounded by the world ocean. As is well known, the *Guta saga* preserves the tradition of Gotland's emergence from the sea. The island sank into the sea at day but rose at night until a man named Thjelvar brought fire to the island. Thereafter it remained on the surface. Scholars have compared this tradition with stories from the Greek world about floating islands, but the author rightly refers to Celtic tradition describing the rise of Ireland from the sea as being a more relevant parallel.

The formation of Sjælland is told in a stanza of *Ragnarsdrápa* and in *Gylfaginning* Ch. 1. The stanza is open to different interpretations but its main message seems clear. With the help of oxen, Gefjon drew from Gylfi a piece of fruitful land which increased Denmark. The text presents philological problems and the meaning of some expressions is obscure. The author discusses the stanza in detail, and also offers her own interpretation. These pages clearly illustrate her scholarly competence in the field of ancient Scandinavian studies. Snorri's account in *Gylfaginning* is more elaborate and explicitly refers to the island as Sjælland. At the same time, he presents another version in the *Ynglinga saga* where the motif of Gefjon's dragging land away with oxen is connected with the founding of the dynasty of the Skjöldungar. The author indicates influence from Roman founding stories as known in medieval Europe and the twelfth-century work *Historia Regum Britanniae*. As to the origins of the Gefjon myth, I would like to draw attention to a similar tradition found in ancient Iran. Yima, the primordial man, enlarges the earth by driving her forward as one drives oxen (*Vidēvdād* 2, 10–11). The stanza of the *Ragnarsdrápa* may reflect archaic Indo-European myths about expanding the earth by means of a divine or semidivine figure driving yoked oxen.

In discussing the meeting of Freyr and Gerðr in the place called *Barri*, as first told in *Skirnismál* stanzas 39 and 41, the author concentrates on the version narrated by Snorri (*Gylfaginning* Ch. 37). The place name there appears as *Barrey* indicating that Freyr and Gerðr will have their meeting on an island. This would be confirmed by the characterization of *Barrey* as *lundr lognfara* taken over from *Skirnismál*. That *lundr* means a grove is clear but the interpretation of *lognfara* presents difficulties. The word *logn* refers primarily to 'calm, windless weather' (cf. *Alvissmál* 22), in particular on the sea. As the author points out, the second element *-fara* may represent the genitive singular of *fari* 'traveller' or be the genitive plural of *för* 'journey.' The compound *lognfara* is interpreted metaphorically by almost all commentators: the grove is a place for lustful, secret rendezvous or has the quality of a lonely, peaceful place. Against this, Deeg sets her own interpretation which seems plausible. Snorri regarded *lundr lognfara* (meaning 'Wald der Windstillefahrer') as a kenning for 'island' and this kenning also inspired him to place the wedding of Freyr and Gerðr on an island.

Some concluding remarks. Reference to the new edition of skaldic poetry is lacking (*Skaldic Poetry of the Scandinavian Middle Ages* 1, Whaley [ed.] 2012). The treatment of skaldic stanzas would have been more up to date if information from that edition had been incorporated into the text. Evidently, the author is not to blame for ignoring the volumes published in 2017 where poetry of named skalds are treated, e.g. Bragi inn gamli and the *Ragnarsdrápa*. The stanzas cited from this poem follow the text of Faulkes (ed.) (1998) and the author is well aware of the fact that the poem is defectively preserved. However, the case of *Eiriksmál* stanza 7 is different. Here I miss a reference to other attempts at establishing the text, in particular those made by Jón Helgason in *Skjaldevers* and R.D. Fulk in *Skaldic Poetry 1*. The author deserves merit for her translations of the Old Norse texts she is citing. They are accurate and follow closely the transmitted text. To sum up, her book is laudable in many ways, in particular for presenting a mythical phenomenology of the "island" in ancient Scandinavia.

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Heidi Hansson & Anka Ryall (eds.), *Arctic Modernities. The Environmental, the Exotic and the Everyday*, Newcastle upon Tyne: Cambridge Scholars Publishing 2017, ISBN 9781527502901, 350 pp.

Published in 2017, editors Heidi Hansson and Anka Ryall's volume, *Arctic Modernities. The Environmental, the Exotic and the Everyday*, is a timely addition to the ongoing discussions of climate change, geopolitics, and what, exactly, the Arctic means. Organized in three sections, Environmental Arctic, Exotic Arctic, and Everyday Arctic, Hansson and Ryall explain in their introduction that the fourteen chapters in the volume use the lens of modernity to examine how people interact with the environment to create new visions of the region—aesthetically, culturally, geographically, politically—and how modernity itself is a concept in flux.

In Environmental Arctic, we are introduced to the Arctic as an environment constantly in relation to humans—for better or worse. The chapters in this section focus on how Arctic literature, much of it written by outsiders, examines a view of nature vs. culture, of human vs. wild, and, perhaps most importantly, the ways in which those juxtapositions continue to change. Susi K. Frank notes in “Ice as a Literary Motif in Soviet Arctic Modernities” that this relationship between humans and the environment has shifted drastically to one in which the human is no longer “the hoped-for sovereign of the Earth, and the master of its fate” (p. 33). Sigfrid Kjeldaas writes later in “Icebergs and Light. Modernity and the Arctic Sublime in Barry Lopez's Arctic Dreams,” the second chapter of this section,

Because the present physical and cultural climate recognizes that the cause of its life-threatening power is ultimately to be found in the imperceptible and unintended forces set in motion by human exploitation of the natural world, when modern Westerners now identify with the sublime Arctic, our sense of its vulnerability is at the same time the sense of our own vulnerability. (p. 60)

In both we are reminded of the ever-changing relationship of those who visit and inhabit the Arctic with the Arctic itself. All of the chapters in this section allow us a better understanding of the ways in which poetry and prose can be used to critically engage with what the Arctic has been and what it may become through the eyes of those who wrote and continue to write about the environment.

Of course, the Arctic is not and has not been a barren landscape devoid of people. Indigenous peoples have long called the Arctic home and *Exotic Arctic* consists of five chapters that focus heavily on the Indigenous experience in the Arctic. Roswitha Skare's chapter, "*The Romance of the Fur Country*. Indigenous Life between Tradition and Modernity," is an especially interesting look at how film was used in the 1920s to bring the exotic to the everyday lives of Canadians. Placed in the context of the more famous *Nanook of the North*, Skare argues that *The Romance of the Fur Country*, which introduces viewers to Indigenous people from across Canada, presented those very people as non-modern, bound to tradition, and unchanging despite the effects of modern inventions. As any folklorist will tell you, though, tradition is constantly changing, being invented, reinvented, and revitalized in order to ensure relevance. These constructions, whether in film or literature, are racist depictions that amplify the colonial and patriarchal worldview held by many in the late 1800s and early 1900s (and still today, if we are honest with ourselves). Skare says as much when she writes of the film's "presentation of the Inuit as uneducated and primitive, acting more like animals than civilized people" (p. 187). The remaining chapters in this section cover a wide range of media and topics and together introduce the reader to Indigenous works, experiences, and issues. Audun J. Mørch's chapter on Chukchi writer Yuri Rytkeu, an interesting analysis of modernity, is also worthy of particular mention.

Finally, *Everyday Arctic* brings us to the ordinary, the mundane, the actual lived experiences of the people who inhabit the Arctic. Two of the chapters in this section focus on Svalbard, one of which, Elin Haugdal's chapter, "Mediating Everyday Life in Svalbard. Herta Grøndal's Photographs, 1950s–70s," is an excellent examination of the ways in which Grøndal used photography to challenge the assumed heroic masculinity needed to conquer the inhospitable landscape of the Arctic. Through a close examination of a number of photographs, many of which are reprinted in this volume, Haugdal helps the reader understand Grøndal's images as not just documentation, but instead "a contested and often paradoxical site of gender, identity and modernity" (p. 286). In doing so, Haugdal's chapter is a welcome response to many of the travelogues written by the stereotypical heroic male explorer that are examined earlier in the volume. Kirsten Thisted's chapter, "'A Place in the Sun.' Historical Perspectives on the Debate on Development and Modernity in Greenland," asks who defines what is and is not modern. Thisted argues that the Greenlander Mathias Storch's *Strejfflys over Grønland*, written in Danish in 1930 and in response to the Dane Sophie Peterson's *Grønland i hverdag og fest*, is in accordance with the belief that modernity is actively co-created by Greenlanders. In doing so, Thisted argues that Greenland's quest for independence is one that is closely linked to modernity (pp. 334–335). Together, the four chapters of this section serve to introduce us to the vernacular experiences of the Arctic through photography, literature, and the lives of those who inhabit the Arctic.

While some essays in this collection do an excellent job of engaging with issues of indigeneity (or, in the case of Thisted's article, engaging with the question of whether or not indigeneity is an appropriate term to use in regards to Greenland), the book as a whole would have benefited from a more critical engagement with work by Indigenous

scholars. Engaging more critically with studies of colonization and decolonization, especially as an analytical tool to better examine understandings of what modernity might mean in different cultural contexts, would have been useful. In addition, analysis of the Canadian Arctic dominates, a fact that the editors duly note in the introduction. But with such a wide geo-political scope as “the Arctic,” it remains true that a wider geographic focus would have given a more complete picture.

That said, a book of this scope can not be all things to all people, and *Arctic Modernities* is a welcome addition to what will surely continue to be an important and ongoing discussion, in academia and elsewhere, about the ways in which the Arctic is defined, delineated, and discussed among the people who live there and the people who don't. Students in courses focused on questions of sustainability in the north who are examining the ways in which the past shapes the present and how the present determines our future would surely benefit from the cultural and aesthetic approach to the Arctic provided in this volume, especially if read alongside work by Indigenous scholars from the region and about Indigeneity in the region.

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Darren McGettigan, *The Kings of Aileach and the Vikings, AD 800–1060*, Dublin: Four Courts Press 2020, ISBN 9781846828362 (paperback), 208 pp.

Delving into the early medieval history of north-eastern Ireland, this book provides a close look at the various responses of the Cenél nEógain dynasty and the Uí Néill kingship to the Vikings and other Irish groups. Centred on local political history, the causes and effects of those responses are detailed, providing context as to how this area developed differently from those further south in Ireland. This most noticeably led to a lack of Viking Age urbanisation and economic development, ultimately developing this area into “a political and economic backwater” (p. 170). McGettigan illustrates the perspective of the Cenél nEógain about the Viking Age, providing positive and negative observations. Historical texts are primarily used with supplementary literary, archaeological, and geographical sources to provide more background on the politics of north-eastern Ireland.

The introduction sets forth the sources and methodology of the book as well as providing context of the Cenél nEógain (Northern Uí Néill) and their expansion in north-eastern Ireland. While predominantly focusing on politics, the chapter (which is the longest chapter) also discusses other aspects, including the economics, society, religion, and geography of the time period. Chapter 1 delves into a very brief overview of the Viking Age and their earliest raids in Ireland as well as their raiding, conquest, and colonisation of Scotland. The second chapter focuses more on the raids of the Vikings and their expulsion from the north by Áed Findliath, king of the Cenél nEógain who later also became High King of Ireland. Although some smaller settlements remained,

McGettigan argues that the “Cenél nÉogain campaign of 866,” when the Viking Age raiders and settlers were expelled from the Antrim coast, “appears to have been a decisive event for the history of Scandinavian settlement in the north of Ireland” (p. 95), preventing long-term settlement. Negotiations and battles between Irish and Hiberno-Scandinavians are examined in the third chapter, particularly key political events, such as the Battle of Dublin in 919, and individuals, such as Óláf Peacock and Muirchertach of the Leather Cloaks. In the fourth chapter, the subsequent generations of the Cenél nÉogain are discussed. The rise to power of Muirchertach’s son, Domnall Uí Néill (Uí Néill being the surname adopted) is described, but the main focus is the subsequent fall from power of the Cenél nÉogain because of economic isolation (due to the previous elimination of Hiberno-Scandinavian settlements) and the rapid rise of Brian Boru to High King of Ireland. Lastly, the conclusion provides a critical analysis of the political events from the ninth to mid-eleventh centuries. It details the reaction of the Cenél nÉogain to the Viking Age and its subsequent effects on north-eastern Ireland, particularly the transfer of their primary residence and the political prowess in holding their own against their Irish, Scandinavian, and Hiberno-Scandinavian enemies, despite its ultimate negative political and economic effects. Overall, *The Kings of Aileach and the Vikings, AD 800–1060* is a widely accessible book on the Cenél nÉogain dynasty and their rise and fall from playing a key role in Irish politics, particularly as high kings of Ireland.

Although the perspective of the other side (Scandinavians and Hiberno-Scandinavians) are secondary, this book provides the Irish perspective of the narrative of the Viking Age. Weighing the positive and negative actions of the Cenél nÉogain, McGettigan provides a rationale for the political effects upon the lack of long-term Viking Age settlements in north-eastern Ireland. While some scholars may consider it vague in details regarding certain areas, the book’s focus is the political ongoings of the Cenél nÉogain dynasty longitudinally to see it strengthening and declining in waves over an extended period of time and whose reach extended far geographically at times. However, this is also the book’s weakness, as the title implies more of an equal treatment of the Irish and the Scandinavians/Hiberno-Scandinavians.

The table of contents and lists of abbreviations and illustrations are at the beginning, while the five maps and two genealogies throughout the book provide a critical resource to refer to while reading. The bibliography and citations are also comprehensive, and the coloured plates between pages 128 and 129 provide a nice visual reference to different aspects of the narrative. The writing style makes this book accessible to a wide audience for both academics and non-academics alike. Scholars and readers of Viking Age Ireland and early medieval kingship will find this a useful book. McGettigan provides an alternative point of view regarding this time period for although it does not radically change the narrative of early medieval Ireland, *The Kings of Aileach and the Vikings, AD 800–1060* does shed light on a geographic area not as often discussed as the Viking Age settlements further south.

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Anders Persson, *Den levande närvaron av Ordet. Åtta essäer om bilden av den rosenianska och den laestadianska väckelsen i norrländsk skönlitteratur* [‘The living presence of the Word. Eight essays on the image of the Rosenian and Laestadian revival movement in northern Swedish fiction’], Skellefteå: Norma 2018, ISBN 9789172171138, 175 pp.

In the northern Swedish regions of Västerbotten and Norrbotten, a strong religious revival movement arose in the late nineteenth century, driven by preachers such as Carl Olof Rosenius and Lars Levi Læstadius. Large numbers of people gathered in villages and towns to listen for hours to their great preachers. The meetings in crowded prayer houses were filled with lamentations and weeping, alternated with bright euphoria and joyous dancing. This revival was a Low Church movement. Sin was described, as well as the various steps leading to Conversion: from the joy of the calling, via the demands of God’s word, to the bliss experienced in the appropriation of forgiveness.

The revival spread like wildfire across the realm of desolate forests. The Word was at the centre of the revival. The Word of God. By listening to it and taking it to heart, man was guided through a spiritual struggle. The preaching of the Word led to a bitter realisation of man’s lack of trust. This deep-felt grief came from a kind of heavy, self-critical and often depressive longing. The explosive joy resulting from having received forgiveness was expressed in tongue-speech or crying. Christ was seen as the Great Forgiver. The Low Church evangelism was spread by great revivalist preachers.

By the early 2000s, this form of Christianity had by and large withered away, and has now more or less disappeared from the mental arena. In the same region, but a hundred years after the emergence of the revival movement, three excellent and internationally known writers emerged, PO Enquist, Torgny Lindgren and Sara Lidman, all three of whom experienced the revival tradition in their childhoods. They all lived in the core area of the popular revival and used the northern dialects in their texts. They have attracted a large readership, who—at some distance—are acquainted with strongly personal and intimate descriptions of the longing for God, the struggle against sin and the joy of forgiveness, with the harsh northern landscape creating a backdrop to the pious struggle.

In a recently published book, Anders Persson, senior lecturer in Literary Studies at Umeå University, presents a close reading of these novelists focused on how the locally spoken rustic dialect (Swedish *bondska*) features in their respective writings. He does not pay much attention to the authors’ lives but reads their texts closely. Initially, he shows how Jack London’s idealising wilderness motifs entered Bernard Nord’s writing, and also, to an even greater extent, that of the preacher and author Tore Nilsson. Nilsson, however, differs from London in that he tries to describe conversion in more positive terms. Here, Anders Persson, by skilfully closing in on the texts, shows how Tore Nilsson approaches the concept of doubt, a feeling of being abandoned by God, an expression of his hidden remoteness. This is interpreted by the author as the central idea of the revival movement.

In the second chapter, the view of doubt is deepened. It is seen as a kind of inner suffering shifting between, on the one hand, a strong feeling of emptiness or abandonment and on the other a quiet and gracious trust. Sara Lidman’s writing is presented in this chapter. She has a more descriptive and partly critical way of presenting the struggle as a kind of religious claim to power, and individual and collective distrust is at the centre of her writing. Her texts contain both sharp and satirical criticism of the harshness and

intolerance of the revival, and at the same time a trust in grace and forgiveness which is strongly influenced by Rosenius.

A central chapter in the book presents a kind of close reading focused on the importance of the *spoken word* in the revival movement. The listening to the preachers' words was a central element of the movement. Not least, the sermons were interpreted by the listeners through their own strong roots, not only in the word of the Bible, but equally in the local dialects. Anders Persson calls this "the preacher anecdote," i.e. short personal characteristics:

We children never got tired of listening to our favourite preacher Gabriel Andersson, the philosopher Zakrisson, the rascal Hällgren or the district's loudest speaker, Viklund. When Anders Viklund cried out during his sermons, most people woke up. [...] He began by speaking softly but raised his voice gradually until he roared like thunder. (pp. 68–69)

He did so in his zeal and desire to be taken seriously and to wake up the listeners from their sinful sleep. Even other preachers were moved to tears. Gabriel Andersson's role model, Berglund, was known as Skråljanne ['Bawling Janne']. He preached and cried, and read from the Bible with tears flowing down his cheeks. The preacher's nickname became the bearer of the Rosenian mentality. Another preacher, who smiled a lot, was given the name Fliir-Janne, from the local dialectal word *fliir* ['smile'].

Another often recurring motif in the authors' texts is dancing. All of the above writers have an ambivalent attitude to this frightening and at the same time fascinating phenomenon that the children of sin engaged in, and which the preachers saw as deeply suspicious. A dawning sexuality was removed from consciousness, but was nevertheless included in the authors' narratives. Here, Anders Persson addresses a phenomenon that existed in the background, enticing and forbidden, not least in Sara Lidman's texts but also in PO Enquist's—the partly erotic secret. Distancing themselves from dancing became a sign that the listeners had taken a significant step and defined themselves as converts. Relapsing into erotic or sensual movements was apostasy. Being attracted to dancing was the beginning of a life beyond grace. So, watch your step!

Anders Persson's book is extraordinarily original. He moves skilfully between literary science and theology, and the book is full of observations of how the solemn biblical world of ideas lived in symbiosis with the popular, festive and merry world. Persson's research makes the book an important source of information for those who want to learn about how a religious folk culture was manifested in seemingly simple prayer house environments.

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Andrew Jennings, Silke Reeploeg & Angela Watt (eds.),
Northern Atlantic Islands and the Sea. Seascapes and Dreamscapes, Newcastle upon Tyne: Cambridge Scholars Publishing
 2017, ISBN 9781443855129, 260 pp.

In the last decade, interest in Island Studies has increased markedly worldwide, which has led to an increased interest also in studies of seascapes, as a counterpart to the long-established field of landscape studies. Island and seascape studies are now being conducted in many places around the world, including at the University of the Islands and Highlands campus in Lerwick, in the Shetland Islands. The anthology *Northern Atlantic Islands and the Sea. Seascapes and Dreamscapes* is a result of a conference in Lerwick 2014 about traditions and narratives in the North Atlantic island world. Of the more than 60 papers read at the conference, 15 have been selected for publication by the three editors, all of whom are researchers and teachers at the University of Lerwick.

All contributions discuss long since bygone days. A good half of the contributions deal with the Middle Ages, the worlds of Vikings and island colonists. Other chapters deal with distant pasts, the Neolithic era or a vaguely defined mythical past, and a few also touch upon the eighteenth and nineteenth centuries. If time is loosely delimited, space and place is more consistently encircled. The introduction, which briefly and concisely describes the book's content, is followed by seven chapters on Iceland and Icelandic sagas and an additional seven on the Shetland isles, the Hebrides and Orkney. Norway, the Faroe Islands, Greenland, North America and other parts of the North Atlantic world are merely touched upon in passing. The obvious difference in how the contributions relate to time and space is hardly a coincidence. As Anna Katarina Heiniger points out in Chapter 5 (p. 55), there are many and quite varying views on what constitutes "an island." But what they have in common is a strong spatial emphasis, as in the common reference book definition: "a piece of land completely surrounded by water." The preoccupation with spatiality that has characterized the discussions about islands and islandness up to recently has led to their temporality being more or less ignored. The result is that "the island" appears as a place beyond time, where time moves more slowly or stands totally still, a commonplace motif and figure of thought in fairy tales, sagas, legends and myths from time immemorial, as well as in just about any modern island tourist brochure.

Aspects of spatiality are thus what the contributions deal with. More specifically, the common underlying theme is the "mythical geography" that has grown out of the interplay between spatiality and the imaginative world, or, as in the book's title, between seascapes and dreamscapes. It is the anthology's greatest merit, and most important contribution, that all the authors in their different ways discuss the complex spaces and flows between the physical and the mental world.

The introduction presents the book's background, the conference in Lerwick 2014 on how Shetland's cultural identity has been shaped by its islandness and the surrounding sea. Throughout the volume, there are many examples of how islanders in the North Atlantic archipelago have developed specific life forms around boats, special abilities to read waves and winds and how they have cultivated contacts over great distances. In his introduction, Andrew Jennings highlights how the Shetland isles, like so many other islands over the world, have been characterized by a dualistic view—on the one hand as an isolated, remote and inaccessible periphery, and on the other hand as a central hub in extensive transport routes for trade, civilization and migration. The Shetlanders themselves have

also been consistently portrayed as characterized by such dualisms, for example between strong individualism and a prominent community and solidarity with other islanders.

In the second part of the introduction, Silke Reeploeg emphasizes how isolation and contact appear as a particularly potent dichotomy in the view of islands, islanders and islandness over a long period of time. It is precisely this field of tension, between isolation and contact, and the ambivalence that arises from it, that constitutes the anthology's most prominent underlying theme. All authors illuminate and discuss the North Atlantic as a cohesive islandscape and seascape. All emphasize the extensive and strong contacts over large areas and long times; as in the chapter on the Neolithic monuments on Orkney, now a World Heritage Site and a destination for tourists from all over the world; in the chapter on how the Neolithic remains at Mavis Grind in the Shetland Islands can be read as powerful visual metaphors and guidance for travelers between the North Sea and the Atlantic; in the chapter on how the Swedish Nobel Prize laureate Selma Lagerlöf reused and transformed widespread motifs from Norse myths in her short story about Sigrid Storråda; or as in the chapter on Norse influences on the Gaelic language in areas connected with the sea, boats and fishing. The examples are many and convincing. However, what simultaneously emerges between the lines is something like a counter-narrative. By actively emphasizing contacts, the authors aim at reversing the widespread notion of island isolation. But, as is the case with most counter-narratives, the result may still well be that what one is opposed to, the widespread idea of the isolation of islands and islanders, is at the same time effectively staged and reinforced.

Seven of the contributions discuss Iceland, Icelanders and the Icelandic tales. In chapter two, the folklorist Terry Gunnell gives an overview of the many creatures that populated Iceland along the border between land and sea and between dusk and dawn. The many legends of encounters with *hafmenn*, *haftröll*, *fjörulalli*, *marmenill*, and other semi-human beings who could show up on beaches during the dark hours, served as a kind of road map for the individual locals, and for the whole community. In the legends, the landscape gained a historical depth, its own character and personality and through the legends common worldviews, ideas, social and moral values were conveyed. In Icelandic folk culture, beaches appear as a particularly potent interface, where the visible and the invisible worlds could meet, as well as the world of the living and the dead, and the worlds above and under the sea and the earth. Not least, the beaches were a liminal zone where the Icelanders could encounter land-washed strangers from the outside, who in the legends were not infrequently described as only half human. The legends were multi-functional, they could be explanatory, dissuasive, persuasive and entertaining and they could provide advice on how to behave when unexpectedly running into strangers. By being designed and told locally, the legends are in many ways clearly Icelandic, and thereby a valuable source for a deepened understanding of the long gone life worlds of the early Icelanders. But at the same time, by also being told in similar versions elsewhere, they clearly testify to the Icelanders' close contacts with the rest of the Nordic world from the very first settlements on the island.

The first Icelanders' everyday struggle for survival is discussed by Ásdís Egilsdóttir in a chapter on miracles performed by the first Christians, several of them later canonized in Iceland. In miracle narratives, the unexpected is at the center, that which may happen despite everything speaking against it. Miracle stories were first orally transmitted, and then written down by clerical authorities, who shaped them according to local traditions. Therefore, Egilsdóttir argues, they can be read as a dialogue between the clergy and the common people, thereby providing a unique insight into everyday life. The common

theme in most preserved Icelandic miracle stories from the eleventh century and a couple of centuries onwards is a desire for survival, health, safety and enough food. In many stories, ships, seas and fish have a prominent role, which can be read as a reflection of the Icelanders' specific life world, but also as an influence from a much larger Christian symbolic world. In the Icelandic imaginary world, the border between sea and land is particularly charged, much in the same way as the forest in Swedish folklore. The sea gives and takes, it is both good and evil. It provides food, and takes lives. What was miraculous for the first Icelanders, was how they, against all odds, managed to land their boats in stormy seas, or in times of famine, how the sea or the rivers were wondrously filled with fish.

In a chapter on Icelanders' views of themselves as islanders during the Middle Ages, Torfi Tulinius reads *Íslendingabók* and *Landnámabók* as stories about the Icelanders' identity and self-image. While the older texts portray Icelanders as inhabitants of a "land," a country, the younger ones describe Iceland as an island, open to the rest of the world but at the same time also a world in and of itself. The Icelanders were indeed a seafaring people with extensive experience of seas and faraway islands. But of today's many notions of islands as insular, i.e. bounded, remote and isolated, there are no traces. For the medieval Icelanders, the island was more of an empirical fact than a concept. It is the material aspects of survival that are focused, the concrete limitations and possibilities at hand, and not "the island" as such.

A similar conclusion is drawn by Anna Katharina Heiniger in her discussion of how islandness is represented in *Íslendingasögur* and by Martina Ceolin in her chapter on the role of islands in *Áns saga Bogsvægis*. In the Icelandic sagas, islands come with many and prominent roles. They are important landmarks and natural harbors, strategic outposts and hiding places. They are places for grand events, meetings, celebrations, battles and funerals. They are residences for particularly powerful and remarkable men and women with extraordinary qualities, giants and dangerous beings. Miracles, visions, Christian baptisms, subversive changes of many kinds take place on islands. In addition, as Marion Polvez's contribution highlights, islands play a central role in stories of banished people and outlaws in Icelandic sagas. During the Middle Ages, expulsion of criminals and political opponents was common throughout the Norse world. Outlaws had to flee the country, either by escaping into wide forests or out to deep seas. In the Icelandic sagas, there are several stories of *útlagi*, men "outside the law" who have been forced to flee to the islands in the North Atlantic archipelago. And like the outlaws, islands could also easily be perceived as being "outside the law," especially suitable as places of refuge. For an Icelandic medieval audience, the stories of outlaws who flee from oppression on the mainland to create their own world anew on a distant island, it would not be far-fetched to interpret such stories in the light of their own history. This motif, Polvez argues, helped to strengthen the island identity of Icelanders.

What all the contributions about medieval Iceland underline is that in Icelandic sagas there is a prominent ambivalence in the view of islands, an ambivalence that emanates from maritime experiences. On the one hand as a limited and well-defined place, in short, an island, and on the other, also as a country, a mainland unlike *ey* and *holmr*. Both in *Íslendingasögur* and in *Áns saga Bogsvægis*, a concrete and pragmatic aspect of islands appears as well as a more symbolic or metaphorical aspect, for example when the "island" is used to show and reflect on the increasingly tense relations between the narrators' Icelandic political realities and the Scandinavian kingdoms' growing claim to power.

A conference anthology usually comprises a number of disparate chapters, at best held together by a few underlying themes and issues. This anthology is no exception,

the 15 short chapters are quite diverse. The fact that the authors here and there engage in parallel arguments that sometimes, but not always, are compatible, shows that they have not had the opportunity to comment on and make use of each other's reasoning and conclusions. It is also noticeable, and somewhat odd, that there are so few traces of the rapidly growing Island Studies literature, or of the extensive literature on mythical geographies, "dreamscapes" and various kinds of imaginary worlds. The research fields that the authors refer to are primarily Norse studies, literary studies, folklore and to some extent regional studies in archeology, geography and linguistics. This is definitely a shortcoming, since much would have been gained by more consistent comparisons with studies of islands and seascapes in other places and other times. But at the same time, this can be regarded as a strength, since the field of Island Studies is thus enriched with perspectives and findings from areas that are otherwise rarely covered. Although direct references to Island Studies are few, the book's themes are nevertheless precisely those that in recent decades have been at the center of the field: island ontology, islandness and island identities, all the notions and characteristics attributed to islands and islanders; and not least, the life worlds and living conditions of islanders around the world. To this growing literature, *Northern Atlantic Islands and the Sea. Seascapes and Dreamscapes* is a valuable contribution.

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Thomas Wallerström, *Kunglig makt och samiska bosättningsmönster. Studier kring Väinö Tanners vinterbyteori* (English summary: Royal power and Sámi settlement patterns. Studies concerning Väinö Tanner's winter camp theory. With contributions from Ulf Segerström and Eva-Maria Nordström), Oslo: Novus forlag 2017, ISBN 9788270999071, 322 pp.

In 1929, Väinö Tanner presented his theory about Sami winter villages. Tanner visited the Skolt Sami winter villages in connection with geological and geographical surveys in the newly conquered Petsamo district. These villages were inhabited by some one hundred people for a few months in wintertime, who formed a kind of primitive communist community with collective decision-making. Tanner imagined that the Skolt Sami winter villages and village organization represented something truly original among the Sami, as they lived far from the countries' centres of power. Later, in a study from 1952, the ethnologist Helmer Tegenren tried to reconstruct the extinct Sami culture in Kemi Lappmark with the help of Tanner's winter camp theory. His research established this theory, which was believed to be an explanatory model that could be used to understand older social conditions among the Sami, including the Western Sami in Scandinavia. A number of researchers used the theory as an explanatory model to describe Sami society prior to the emergence of large-scale reindeer nomadism and the start of colonization.

This was also the starting point for Thomas Wallerström in his interdisciplinary research project focused on the old church and market place in Arvidsjaur. Arvidsjaur was initially assumed to have been a winter village similar to those of the Skolt Sami. Wallerström's general research questions are: Have there been any winter villages of the Skolt Sami type in Scandinavia? Was Tanner correct in assuming that these villages are marked on Andreas Bureus's map from 1611 and Olof Tresk's map of Torne Lappmark from 1643? What were the consequences of the implementation of the new state administration in the north?

Over the years, there have been some critical voices against Tanner's winter camp theory. As early as 1987, ethnologist Kerstin Eidlitz Kuoljok held that the Skolt Sami winter villages were actually a Russian village organization, and in 2011, she presented a more comprehensive study on the issue.

Thus, there were some doubts about the validity of Tanner's theory prior to the investigation in Arvidsjaur. Had the winter camps really existed with the wide distribution and the dating proposed by Tanner? As the plan for the investigation in Arvidsjaur did not work out quite as originally intended, Wallerström decided to tackle the winter camp problem in a new and thorough way.

Wallerström's study can be said to follow three lines of investigation. In his book, he discusses what has previously been written on this subject and the empirical evidence that formed the basis for the conclusions drawn by previous researchers. The empirical support turns out to be surprisingly weak. The symbols with huts in the old maps may show something other than winter villages. They might rather be an expression of the territorial state's ambitions for taxation and trade. A new way of trying to trace the winter villages was historical vegetation surveys in Arvidsjaur. If about a hundred people lived together in a winter village, it is inevitable that the vegetation would have been affected, especially if that place was used for a long time, as the need for wood and timber would have been great. Later, comparative vegetation historical surveys were also carried out in two other places, Rounala north of Karesuando and Markkina on the Finnish side of the border. These contributions were made by Segerström and Nordström. The results of the palaeo-ecological surveys do not support the winter village theory. The cultural impact during the time the winter villages are supposed to have existed was found to be extremely small. It is only when permanent settlements with agriculture were established that a clear cultural impact can be seen. The conclusion is that neither the written sources nor the palaeo-ecology support the assumption of such villages. Here, it might be objected that only a few places have been thoroughly examined.

Wallerström then embarks on a review of the archaeological studies that are said to confirm the winter village theory. Investigations have previously been made in Pite, Lule and Kemi Lappmark where rows of hearths have been found. He asks the question whether a row of 5–10 hearths can be said to constitute a winter village of the Skolt Sami type. In his study, Tanner describes one of the Skolt Sami winter villages as being populated by 39 households comprising 140 people. Wallerström's conclusion is that if the sites with the rows of hearths were populated during the same time, they can be regarded as group winter settlements. This is not the same thing as the winter villages Tanner described.

Wallerström's critical examination now turns to the Skolt Sami winter villages where archaeological investigations were made in the 1970s and 1980s. Here, if anywhere, a model of what the remains of a winter village should look like ought to be found. The Finnish archaeologist Christian Carpelan concluded that the winter camps could only be

traced back to the sixteenth century and that they are related to state taxation. Carpelan also pointed out finds of Russian provenance in the find material. At this time, the Sami were taxed by Russia, Sweden and Denmark-Norway. These results do not fit very well with the theory that the winter camp villages are an original pre-colonial Sami community organization.

Wallerström then discusses the problem along the third line of investigation, namely how royal power was established in the north. It is a discussion about the Sami and the principle of the territorial state which leads to a number of pieces of the puzzle falling into place. The reason for the lack of positive evidence for old and original Sami winter villages is simply that they never existed. The meeting and market places established during the sixteenth and seventeenth centuries are a consequence of Swedish colonialism in the north of the European geographical state model. By paying tax, the Sami were drawn into the Swedish trading system. Wallerström also highlights the doctrine of dominion as a factor in understanding Sweden's political geography and states that the research needs new starting points.

Wallerström's study is undeniably very interesting. The study's new starting points make the conclusions drawn somewhat ground-breaking. Will it be met with silence from the research community, the way Eidlitz Kuoljok's previous studies were? Or will it open up for further research with new points of departure?

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The journal is published by Umeå University and Sweden's northernmost Royal Academy, the Royal Skyttean Society.



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ISSN 1654–5915