



Original article

Enacting the substrata: Scientific practice and the political life of uraniferous rocks in Cold War Greenland

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ARTICLE INFO

Keywords:

Political geology
Geographies of science
Historical geography
Greenland
Uranium
Field science

ABSTRACT

In the midst of growing demands for resource based development, Greenland's uranium has become increasingly entwined with questions of economic sustainability and independent sovereignty for this small island nation. Current geological imaginaries of the substrata inform visions of a prosperous Greenlandic mining future. Yet the political life of Greenland's radioactive components and rare earths has a history that dates back decades, if not centuries. In order to comprehend how the geological imaginaries that inform current rare earth politics and practices in Greenland came into being, the history of uranium prospecting must be taken into account. Arguing that these imaginaries are not merely an artefact of a recent 'rush for resources' or a response to what is simply 'found' in nature, this paper explores how the most prominent site of uranium extraction, the Ilímaussaq complex, was first made available to extractive political rationalities. Drawing on archival research in Copenhagen (2015-2016), this article traces the first years of state prompted exploration of Ilímaussaq from 1955 until the conclusion of the first drilling programme in 1958. Unpacking the scientific processes, mechanisms, and practices through which Ilímaussaq was enacted both in the field and in laboratories, this paper interrogates the material and social practices which first brought it into being as a radioactive complex and a space of extraction.

1. Introduction

Two hours' sailing outside the small settlement of Narssaq in Southwest Greenland lies a geological formation which has intrigued scientists and naturalists for centuries (Bondam, 1955; Sørensen, 1966a). Known by geologists as Ilímaussaq, this unique complex has been praised for its spectacular geology and richness in rare earth elements since it was first reported on in 1806 (Giesecke, 1910; Sørensen, 2001). More recently, Ilímaussaq and its rare earths have emerged at the centre of Greenlandic politics, framed as key to generating the necessary revenue for this semi-autonomous constituent of the Danish Commonwealth to finance full independence (Nuttall, 2015). In 2013, the Greenlandic parliament, Inatsisartut, made the controversial decision to lift a longstanding moratorium on the mining of radioactive minerals. Geological coincidence means that uranium and thorium would be by-products of rare earth extraction at Ilímaussaq. Hence, the end to the zero-tolerance policy triggered a wave of neo-extractivist discourse involving Ilímaussaq, accompanied by public and political contestation in Greenland and beyond (Nuttall, 2013; Vestergaard, 2015; Bjørst, 2016).

For Greenlandic political and business elites, Greenland's future is entangled in geological imaginaries of the substrata (Nuttall, 2012,

2013). Its geological riches have seemingly granted Ilímaussaq a prominent position in these evolving narratives. However, as noted by Klinger (2018, 28), the existence of deposits does not, in itself, explain why a particular site emerges as a rare earth frontier. Like any other resource, rare earths and their residuals do not simply 'exist', but rather 'become' through the process of their enrolment into particular social orderings of nature (Bakker and Bridge, 2006). The valorisation of certain material qualities of earth and the associated categorisation of earth into distinct geological bodies makes it possible to reconfigure particular places as spaces of extraction. The production and circulation of geological knowledge is thus key to enabling political and economic actors to view mining activities as a means of meeting broader political and territorial objectives (Klinger, 2018, 28; Braun, 2000; Bridge, 2014).

Techno-scientific narratives of potential Greenlandic mining frontiers such as Ilímaussaq tend to be directed towards the future (Nuttall, 2012). However, visions of mining futures are inescapably linked to practices of the past (Klinger, 2015). As noted by Gregory, the past is always present as part of the material and immaterial fabric of space (Elden et al., 2011). The political life of the rare earths of Ilímaussaq is rooted in a long history coloured by contentious politics, Danish territorial ambitions, and institutional tensions (Nielsen and Knudsen,

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<https://doi.org/10.1016/j.exis.2017.12.010>

Received 18 February 2017; Received in revised form 5 November 2017; Accepted 16 December 2017

Available online 13 February 2018

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2013). In an effort to unravel how Ilímaussaq emerged as a rare earth frontier, this paper traces the first comprehensive state-sponsored exploration of Ilímaussaq's extractive potential from its beginning in 1955 until the conclusion of the first drilling programme in 1958. As argued by Richardson and Weszkalnys (2014), the making of resources is distributed, both spatially and temporally; resources are relational, characterised by their formation as well as their deep, material properties. In telling this story, this paper aims to problematise the processes, distributed practices, and material histories involved in the making of Ilímaussaq as a space of extraction.

During the 1950s, a prominent Danish scientific presence in Greenland was seen as a critical means of bolstering Danish territorial sovereignty in the face of a substantial and sustained US presence on the island (Olesen, 2013; Nielsen, 2016; Heymann et al., 2010). Practices of economic geology in particular were mobilised as performances of active occupation (Ries, 2011, 2003; Scott, 2008). The use of field science as a technology of (post-)colonial occupation and governance is well-documented by geographers of science. Scholars such as Powell (2007), Bridge and Fredriksen (2012), and Edney (1997) have mapped out the intimate relations between the practices of field science, the mapping of resources and territory, and the political and economic priorities of distant state actors. States mobilise science not only to define the bounds of their territory, but to record their natural assets and thus extend their territorial reach below the level of the surface (Braun, 2000; Bridge, 2013; Scott, 2008). As Livingstone (2010, 5) notes, field sciences “at once impose rational order on the seeming chaos of nature, deliver to governments a sense of territorial cohesions, and supply servants of the state with geographical data essential for fixing tax, stimulating economic growth, exploiting resources, and maintaining military defence.” Exploration, marking, and mapping are projections of interests onto geographical spaces and an opening up of the material world to manipulation and control (Naylor and Ryan, 2010; Strandsbjerg, 2010; Driver, 2001). As this paper draws out, these practices are situated, material, and shaped by direct physical encounters between human beings and an acutely material world which exceeds us (see Livingstone, 2003, 2010; Edney, 1997; Strandsbjerg, 2012).

As already noted, natural resources are distributed things. Their ‘essence’ is located across their material and their socially imbued qualities. Hence, it is important to pay attention to both the practices through which the matter of nature is reformed as well as to how matter itself both enables and pushes back against political goals and desires (Richardson and Weszkalnys, 2014). Hence, this paper hones in on the scientific practices and material affordances which came together to bring Ilímaussaq's rare earths into political existence and cast its radioactive deposits as markers of a potential space of extraction. The paper interrogates the work involved in transforming the little-known mountains of Ilímaussaq into objects of knowledge in an attempt at drawing them into Danish extractive economies. This is a story of how, in practice, these faraway Greenlandic geographies were territorialised and how they were incorporated into circuits of knowledge, capital, and power through their material and discursive reconfiguration as a ‘Danish’ national resources.

Focusing on the practices of mineral prospecting may provide valuable insights into how remote territories are brought into the political realm of the state (Bridge and Fredriksen, 2012; see also Kuklick and Kohler, 1996). Hence, this article unpacks the metrics, methods, and prosthetic technologies through which the deep structures of the Ilímaussaq complex were first rendered legible and brought into the domain of political rationality. In doing so, it interrogates the productive capacity of geoscience, not only in terms of scientific discourse and representation, but in terms of how geoscientific enactments of a voluminous and materially complex earth brought a radioactive mountain complex into being.

2. Denmark's nuclear awakening

When Denmark was liberated from German occupation in 1945, Danish geologists and politicians had long been privy to the potential uranium riches of Ilímaussaq (Ussing, 1912; Sørensen, 1966b). Yet following the impact of the bombing of Hiroshima, the political climate surrounding fissionable materials was tense. Consequently, the Ilímaussaq uranium was deliberately kept off official political agendas despite the fact that Danish national energy deposits were nearing depletion (Nielsen and Knudsen, 2013; Koch, 1958). However, in the years following World War II, the economic significance of radioactive minerals came on the rise. In 1953, US President Eisenhower delivered his famous *Atoms for Peace* address at the UN General Assembly, which generated an international surge in nuclear optimism (Krige, 2006, 2008). Nuclear science was effectively ‘rebranded’ and became a symbol of modernity and progress more so than a threat to international security (Klinger, 2015; Hecht, 1998). By the early 1950s it had become known that low-grade uranium ore was abundant (Helmreich, 1986). As established nuclear powers, most notably the USA, began lessening their formerly tight grip on who could mine and trade in radioactive resources, recovering post-war nations saw opportunities to establish themselves as players in the emerging atomic order (Nielsen and Knudsen, 2010). The changing international politics of uranium and the shifting discourses and values associated with uranium prompted a reconfiguration of formerly remote nuclear resource frontiers across the globe (Hecht, 1998, 2012).

The changes in the international political climate inspired change of the narratives surrounding the Greenlandic substrata and its radioactive components. Keen to secure its energy future and position itself as a scientifically advanced nation, the Danish government appointed an Atomic Energy Commission in the spring of 1955 (Nielsen and Knudsen, 2010). To build a thoroughly national nuclear programme, one of the first acts of the Commission was to initiate large scale uranium prospecting in Greenland, which was then considered Danish territory (Koch, 1958). Uranium prospecting not only allowed the Danish government to capitalise on the underground; it also offered an opportunity to communicate effective occupation and territorial jurisdiction amidst an uncomfortable US military presence on the island (see Archer, 1988; Heymann et al., 2010; Petersen, 2013; Olesen, 2013). This sentiment was echoed in the overtly nationalistic emphasis of one Danish journalist reporting on the expeditions:

[B]eyond any economic or geological results, it is gratifying to witness Danish geologists, Danish scientists, and Danish engineers investigate Danish mountains.¹ (Berlingske Tidende, 1958, 14)

Eager to set its ambitious plans in motion, the Commission approached the Greenland Geological Survey (GGU) proposing immediate action in the form of a 1955 field expedition. The GGU told the Commission in no uncertain terms that a rushed effort would be both foolish and futile as at least another ten years of basic geological mapping was needed before an actual assay was feasible (GGU, 1955; Noe-Nygaard, 1955). Furthermore, there was a national shortage of trained geologists, and the 1955 field season, which was less than four weeks away, had already been planned for. Despite its words of discouragement, the GGU reluctantly recommended the Ilímaussaq complex as a likely site of potential uranium ore (Noe-Nygaard, 1955). Ignoring the GGU's cautions, the Commission turned to the newly established Danish Defence Research Establishment, which carried out basic research in nuclear defence strategies and provided training for conscripts with mixed scientific backgrounds. Here they found the enthusiastic and well-connected Lieutenant Colonel Mouritzen, who despite the extremely short notice managed to procure all the necessary

¹ Author's translation from Danish (see also Nielsen and Knudsen, 2013). All subsequent quotes from Danish language sources are the author's translations.

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