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Arctic Cartography: Making Space and Claiming Sovereignty through The Danish Continental Shelf Project

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Abstract

This thesis examines how The Danish Continental Shelf Project has laid claim to an extended continental shelf comprising 895,541 km^2 of Arctic seabed and subsoil. Specifically, the thesis tries to understand how Denmark-Greenland's expansion in the Central Arctic Ocean is made possible and how Denmark-Greenland 'knows' where to draw this territorial boundary. Jeppe Strandsbjerg's (2010) *Territory , Globalization and International Relations* is employed as a theoretical lens through which the research purpose can be investigated. The theoretical framework is based on the argument that we live in a "cartographic reality of space" (2010, p. 4) and it theorizes the role of cartography in producing autonomous space, through which territory and sovereign rights can be claimed. Strandsbjerg's theory draws on Bruno Latour's science studies, and therefore puts emphasis on the role of so-called non-humans in creating 'reality'. This framework highlights the role of the Continental Shelf Project in creating a cartographic reality of space, where borders can be drawn, and territory divided. Simultaneously, the employment of the theory also brings to light how the creation of *oceanic* cartographic spaces cannot be directly compared to cartographic space created on the basis of landmass. The thesis also provides a thorough introduction to the legal framework, which shapes the existence of the Continental Shelf Project, namely the United Nations Convention on the Law of the Sea (UNCLOS), in particular its article 76. The empirical basis of the investigation is interview data, produced through ten semi-structured depth interviews. The interviews were conducted with participation from central actors in the project, the majority of whom are scientists. The interviews have been transcribed and coded. The resulting analysis brings insights on the process of claiming an extended continental shelf, the role of national interest in map-making and the specific reality created in and through the claim north of Greenland. The thesis thus argues that we do live in a cartographic reality of space, as claimed by Strandsbjerg, but adds nuance to this assertion: In the process of creating Arctic cartographic space non-humans are assigned a prominent role yet are also squeezed into certain shapes to fit political wishes of a maximized claim to an extended continental shelf.

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Abbreviations and special terms

CLCS: The Commission on the Limits of the Continental Shelf

DMI: Danish Meteorological Institute

DTU: Technical University of Denmark

EEZ: Exclusive Economic Zone

EI: Empirical Indicator

FOS: Foot of Slope

GEUS: Geological Survey of Denmark and Greenland

IQ: Interview Question

Naalakkersuisut: Government of Greenland

nm: Nautical Miles

TC: Theory Concept

TQ: Theory Question

UNCLOS: United Nations Convention on the Law of the Sea (also called 'the Law of the Sea', or 'the Convention')

Introduction

On 16 November 2004 the Kingdom of Denmark[1] ratified the United Nations Convention on the Law of the Sea (UNCLOS). Upon ratification, a state has ten years to submit the relevant material to the Commission on the Limits of the Continental Shelf (CLCS). This submission is a chance for a state to show, through newly gathered and interpreted geological and geo-morphological data[2], where the seawards limits of the state should be drawn. Having to meet this ten-year deadline, the Kingdom of Denmark (termed Denmark-Greenland in this thesis – explanation follows) established The Continental Shelf Project in 2002 with the purpose of gathering, interpreting, and presenting the data, and to participate in negotiations at the CLCS in New York, in order to lay claim to an extended continental shelf.

Data from the seabed and subsoil of Greenland and the Faroe Islands has now been gathered and interpreted, and a submission consisting of five partial submissions relating to different geographical areas, has been presented to the CLCS. The last of these five submissions, pertaining to the northern continental shelf of Greenland, was submitted on 15 December 2014. This final submission lays claim to an area extending across the Arctic Ocean, all along the submarine feature known as the Lomonosov ridge, and up to the Russian Exclusive Economic Zone (EEZ) (see figure 1).

1 'The Kingdom of Denmark' refers to Denmark, Greenland and the Faroe Islands. UNCLOS entered into force for the Kingdom on 16 December 2004.

2 Geo-morphology is a term referring to the study of the features of the earth's surface, whereas geology is more of an umbrella term, encompassing the processes and features below the surface of the earth.

Figure 1: Claims submitted to the CLCS

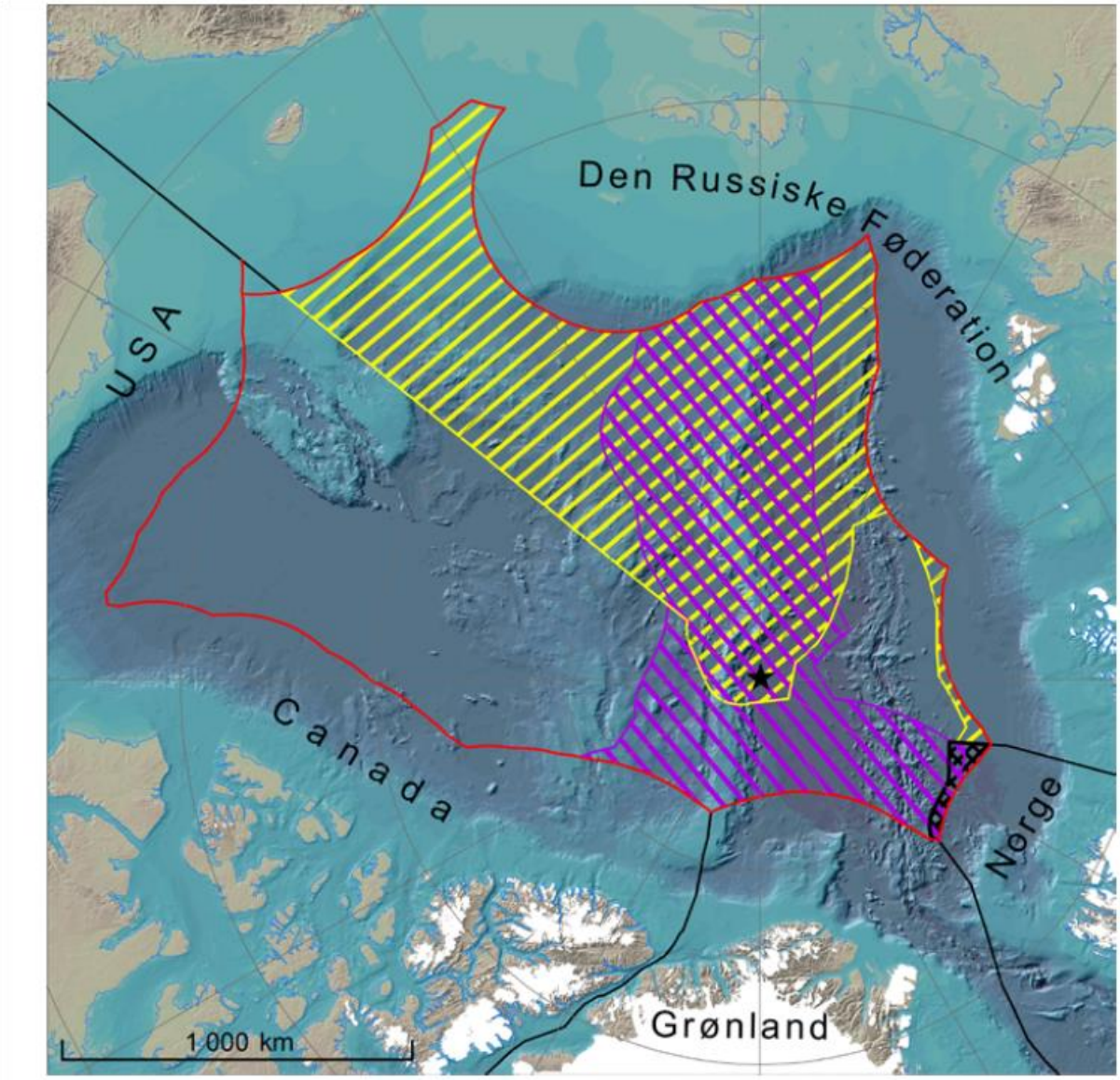


Figure 1: From Marcussen & Lehmann Weng (2016, p. 204), showing the claims of the Kingdom of Denmark (purple) and its overlap with the Russian claim (yellow) and the Norwegian continental shelf (black). The black star shows the location of the North Pole (translated from Marcussen & Lehmann Weng, 2016, p. 204).

But how did Denmark-Greenland come to lay claim to almost 900,000 km^2 of the Arctic seabed and subsoil – including the North Pole itself? A number of questions arise when one starts to understand the sheer size of the area claimed, and the negotiation opponents Denmark-Greenland will eventually have to face, namely Russia and Canada.

I am curious to understand how the claim made by Denmark-Greenland has taken the shape it has. The process of gathering scientific data and applying UNCLOS' articles to it is complex. But I believe that it is important for the regular citizen to be able to understand (to a certain degree of detail) how the large claim has materialized from scientific data gathered and processed by geologist and geophysicists. Moreover, an important task of Political Science is to understand how we know where to draw international borders and how the expansion of a sovereign territory is made possible through international organizations. I aim to be

able to show how Denmark-Greenland constructs an expansion of the realm as something given and objectively correct. A critical examination of how geology is used as evidence in the establishment of something so socially constructed as sovereign territory and international borders is an important piece in the understanding of how this construction is established as something 'we know'. In the end, Denmark-Greenland's attempt to expand could have far-reaching political and economic consequences, and it is therefore important to understand the process that could lead to this expansion. As such, this thesis aims to understand three things:

First, in practical terms, how has Denmark-Greenland collected and interpreted data and how does this lead to the present claim in the area north of Greenland? This first research question is of a journalistic character as it aims to enlighten the reader, who may not be a geo-scientist by profession, on the UNCLOS rules and their relation to the geological and geo-morphological features of the ocean floor and subsoil;

Second, how is the expansion of Denmark-Greenland made possible through cartography? That is, how does Denmark-Greenland try to prove its sovereignty of the seabed and subsoil through scientific data, and how does Denmark-Greenland create space through surveying and mapping techniques? This question assumes that claiming territory, and thereby sovereignty, is not just about discursive constructions, but also necessitates a more tangible, geological dimension. This assumption will be unfolded in the theoretical section;

Third, in the process of claiming an extended continental shelf for Greenland, to what extent is the scientific ideal of objectivity (understood as value- and interest-free methods and results) compromised for the sake of claiming as big a territory as possible? With this research question, I am curious to understand what happens when the tangible, physical reality of the earth's crust and sediments meets socially constructed sovereign territory and sovereign rights. How do geology and geo-morphology of the earth help us in knowing where to draw lines on a map? And where does it leave us epistemologically if the objectivity of natural science has indeed been compromised in the name of national interest?

These three sub-questions are summed up in the overarching research purpose, 'How is Denmark-Greenland's expansion in the Central Arctic Ocean made possible and how does Denmark-Greenland 'know' where to draw this territorial boundary?' This and the three research questions are what the thesis aims to answer.

Within the given space, certain limitations are necessary. First of all, the focus is limited to the fifth and final partial submission from Denmark-Greenland to the CLCS. While the other four partial submission, which deal with areas north and south of the Faroe Islands, and south and east of Greenland, are also important, the submission pertaining to the area north of Greenland and extending across the Central Arctic Ocean, is by far the largest and goes much further than UNCLOS' 350 nautical miles (nm) distance limit. It is, arguably, also the most contentious of the five, not just because of its claim to the North Pole, but also because of its substantial overlap with the Russian submission – and most likely also with the Canadian submission[3]. These factors make it particularly pertinent to understand the process behind this submission and its reasoning.

[3] The Canadian submission is expected in the beginning of 2019.

Naturally, the Continental Shelf Project as a whole is the overarching focus, and will be referred to continuously, but geological and geophysical elements are focused on the final submission north of Greenland ('the submission' or 'the claim' from hereon).

Connected with this is another important limitation: The aim of examining the research question is not to make predictions about where future boundaries will be. It is futile to speculate on this as the CLCS has yet to make a 'final and binding' recommendation on the submission, just as the subsequent negotiations will not begin until the CLCS' recommendation is ready. Rather, the aim is to understand the practical scientific, the cartographic, and the epistemological process underlying Denmark-Greenland's fifth submission as specified above.

Finally, the thesis is less concerned with the specifics of the Greenlandic-Danish relationship and the future of this, than it is with the interplay between international law (UNCLOS), the politics of claiming sovereign rights, and the role of natural science. The history and current relationship between Denmark and Greenland will naturally be touched upon, but the current "sovereignty games" (Adler-Nissen & Gad, 2014) between the two are outside the scope of this investigation. It is the submission, made as one unified 'Kingdom of Denmark' that forms the focus of the thesis, not the colonial, post-colonial and future engagements between Greenland and Denmark. Despite this, a note on the current relationship between Denmark and Greenland is still appropriate.

As Pram Gad (2013, p. 218) notes, the relation between Greenland and Denmark goes back to the arrival of missionary Hans Egede in Greenland in 1721. This relation was colonial by nature; the Danes took the position of the 'civilized' colonizers, whose role it was to control and 'teach' the Greenlanders about European civilization. The strategies of the colonizers also led to the formation of a Greenlandic elite, which would over the years develop aspirations of a more equal relationship with Denmark, and eventually wish for full and formal independence. Greenlandic nationalism and aspirations towards independence continued to grow – Pram Gad even describes the aspiration to become independent as part of Greenlandic identity (2013, p. 119). Today Greenland and Denmark form a "Community of the Realm" (Pram Gad, 2013, p. 119) – a *Rigsfællesskab* – with many areas of governance having been devolved to Greenland after 'home rule' was granted in 1979. Policy areas such as education, health care, and social services became the responsibility of Greenland after this (Rosamond, 2015, p. 508). In 2008 the Greenlanders voted in favour of the Self-Government Act, which took effect in 2009. This act granted Greenland control of areas such as policing, mineral resources management, and the judicial system, but with matters of foreign policy, security, and defense remaining the responsibility and prerogative of Denmark. The annual block grant from Denmark also remains, but with plans of its eventual out-phasing. The wish for Greenlandic independence continues to attract more supporters, but for now Denmark and Greenland remain in a very particular post-colonial relationship. This is also evident from the Continental Shelf Project and its constellation under the name 'The Kingdom of Denmark'. Because the focus in the work at hand is on the submission north of Greenland and does not look at the Faroese submission, the term used here will not be 'the Kingdom of Denmark', but rather 'Denmark-Greenland', which is also used widely in the literature.

With these caveats in place, the thesis proceeds in the following steps. The first section reviews the literature relevant to the question in a very broad manner. This review serves firstly as an introduction to political science and geopolitical research on the Arctic, and secondly it synthesizes the more specific literature on the (critical) geopolitics of demarcation of borders in the Arctic, sovereignty claims and the CLCS-process. Having identified a need for a theoretical lens that can incorporate all the aspects of the Continental Shelf

Project, the second section suggests Jeppe Strandsbjerg's (2010) contribution as a resourceful theoretical framework which can guide the thesis in answering its main research purpose and its sub-questions. The third section is a legal deviation into the technicalities of UNCLOS, specifically its article 76, which details how to claim an extended continental shelf – as such, this section is of a technical and explanatory nature, rather than being analytical. Having accounted for the legal framework relevant to the Continental Shelf Project, the thesis' fourth section explains and justifies the methodological set-up as an interview study employing semi-structured depth interviewing. Following naturally from this, the fifth section operationalizes the theory into an interview guide and also discusses the coding strategy used in the analysis. The sixth section comprises the analysis of the interview data, and evaluates how well it corresponds to the theory employed. Insights gained here are then discussed in relation to the research questions and overall purpose in the seventh section, in which a critical discussion of the validity and the limitations to the research design are also discussed – included in this is an attempt at triangulating the results. Finally, the thesis concludes on the research questions and overall research purpose in its eighth section.

Literature review

Academic debates on the Arctic in Political Science and its subfields of International Relations and Geopolitics cover a wide range of topics and approaches. Academics have examined subjects spanning from the role and rights of indigenous peoples in Arctic governance (see for instance Fabbi, 2015; Koivurova & Heinämäki, 2006; Shadian, 2013; J. Strandsbjerg, 2014), to security concerns and military capabilities of the Arctic states (Borgerson, 2008; Rahbek-Clemmensen, 2014; Wang, 2013), or to the mediating role of the Arctic Council (Dodds, 2015; Koivurova, 2012) and sustainable Arctic policies (Palosaari & Tynkkynen, 2015; Tennberg, 2017). This review cannot cover the entirety of the Arctic research catalogue, and so will focus on the literature most relevant to its research questions, i.e. literature on Arctic (critical) geopolitics, and on the role of UNCLOS in the Arctic and on Denmark-Greenland's role in the Arctic, including its Continental Shelf Project.

'The Arctic' - A contested region

An investigation concerned with the expansion of territory and claims to sovereign rights based on geographical positions and geological features naturally points to the existing literature on Arctic (critical) geopolitics. This literature is relatively new and represents many different approaches to the study of Arctic geopolitics. The first point to absorb from this literature is that the idea of 'the Arctic' or one united Arctic region is not a universally accepted notion. Some states (and academics) prefer the term 'the High North' as is evident from Kristoffersen's (2014) chapter on 'the Norwegian High North' policies or from Heininen's (2014) chapter on 'Northern' geopolitical actors. This lack of terminological agreement and the historical roots of the different terms are summed up well by Keskitalo who notes that the Northern parts of Finland, Norway and Sweden have historically been described in national discourse, not in "relation to the 'Arctic' frontier identity or features described there" (Keskitalo, 2015, p. 429). Keskitalo continues by pointing out that the geographical delimitation of the Arctic region used by the Arctic Council is arbitrarily based on the definition of Antarctica.

It is clear from the above that 'the Arctic' itself is a contested concept, not a geographical given. 'The Arctic' does seem to be gaining popularity as a term, evident from the fact that not only do the founding members

of the Arctic Council (known as the A8) now all have some version of an 'Arctic' strategy, but so do non-Arctic states like the UK and Japan. However, it is important to keep in mind the diversity of peoples, climates, socio-economic realities, and historical legacies across the so-called 'Arctic'. Present-day referral to the Arctic is in many ways a relatively new designation. It is therefore, as Bruun & Medby write in their excellent review of current geopolitical Arctic research, important to "recognise the multiplicity of ways in which this changing region may be understood, imagined and lived" (2014, p. 916).

The role of discourses in Arctic politics

This leads to the second point that can be extracted from the critical geopolitical writings about the Arctic. Namely, that we need to seriously examine and question the geographical assumptions employed in international politics (Powell & Dodds, 2014, p. 9). As Powell & Dodds (Ibid.) note, geographical knowledge(s) and imaginaries play a key role in how (sovereign) power is expressed and asserted. This is where critical geopolitics differs from more classical geopolitics. It does not assume geographical 'facts' to be pre-given. Rather, it is through certain assumptions and definitions about the region and its geography that national strategies on the Arctic come into being. In this way, the aim of critical geopolitics is to "examine the geographical specification of politics" (2014, p. 9), i.e. to understand how politics, in the form of interest, power, conflict and negotiation, is inscribed in or on certain terrains.

For Albert & Vasilache, who take a Foucauldian approach to the Arctic as a region, this means that the Arctic can be seen as a space of unfolding governmentality, in which an "assemblage of actors" (2017, p. 11) discursively construct the region. Accordingly, the Arctic is not so much held together by geography or its member states, but by a broad spectrum of actors who represent the region in certain ways through discourses, imaginaries and practices. In this understanding of the Arctic, discourses are both what make and what represent the region (Ibid., p. 9). Discourses are the analytical unit, as prescribed by Foucauldian approaches (Ibid., p. 8). This leads Albert & Vasilache to identify a number of representations, echoing what others have found (see Bruun & Medby, 2014, pp. 916–917; Dittmer, Moisio, Ingram, & Dodds, 2011, pp. 203–206; Heininen, 2014, pp. 241–242; Steinberg, 2010, p. 81). These include representations of the region as a wild and untamed (feminized) frontier awaiting masculinist exploration, as a gold mine of resources awaiting extraction, as a space of conflict between states, as a region known by and primarily for its indigenous populations, and finally as a region of stability and peace primarily because of regulative measures and international law (Albert & Vasilache, 2017, p. 9).

Keskitalo (2015) explains why it is important to identify and interrogate these discourses. In Foucauldian thinking, there is no such thing as rational actors, but rather subject-positions through which people form understandings of the world through and in relation to discourses. There is no position 'outside' discourse, and as such discourses assert a "descriptive violence" (Keskitalo, 2015, p. 423). They entrap their subjects in seeing and understanding the world according to certain logics. Heininen phrases this same notion concisely

when he writes that "[t]here are no politically and geographically innocent definitions of the Arctic" (2014, p. 241).[4]

But if it is true that there is no position outside discourse, no politically innocent depictions of the Arctic, why investigate its discourses in the first place? The researcher, who is also embedded in certain discursive constructions of the world and the Arctic, cannot free herself from this descriptive violence? While it might not be possible to free oneself from existing depictions of the region, it is, according to Keskitalo, possible to approach a more accurate description of those or that, which is being described, by continuously critiquing existing discourses (2015, p. 427). In that way, discourses may come to match the experiences of those or that being described by it more closely. While the absolute truth cannot be found, it becomes possible to "review what powers contribute to the 'knowledge' to which we are exposed" (Ibid., p. 427).

Knowledge production in and on the Arctic: Three effects of mapping and surveying

In continuation of the focus on discourse, much of the literature on Arctic space, territory and politics focuses on knowledge production and the existence of many different types of knowledge on the Arctic. Indeed Powell & Dodds (2014) have entitled a whole section of their edited volume on the polar regions 'knowledges'. They note that indigenous communities of the Arctic know the Arctic in other ways than the prime ministers and bureaucrats in Copenhagen, Ottawa, and Moscow do (Ibid., p. 10). The benefits of incorporating and understanding indigenous knowledge(s) is a point often repeated (See for instance Bates, 2007; Bruun & Medby, 2014; Krupnik, Aporta, Laidler, Gearheard, & Holm, 2010) and the growing importance of incorporating indigenous understandings of concepts such as sovereignty is gaining traction (see Fabbi, 2015). Particularly relevant for the process of claiming new territory, and therefore also Denmark-Greenland's claim, is the production of cartographic knowledge. Techniques of mapping and surveying are key to a number of efforts undertaken in relation to the Arctic. One example is oil and natural gas discovery and exploitation as Kristoffersen mentions (2014, p. 144). Another example is of course the process of gathering data from the seabed and subsoil which is needed in order to make a submission to the CLCS.

Scientific practices, such as surveying and mapping serve at least three purposes in relation to the Arctic. First of all, it is central to "the geopolitical constitution of Arctic space" (Dittmer et al., 2011, p. 203; see also Dodds, 2010, p. 66). This is so because the natural scientific exploration of the Arctic helps make it what Dittmer et. al. call "a space of the real" (2011, p. 203) meaning that it comes to be seen as a real, tangible geographical place, deserving of our attention. It comes to be seen as a place where experts go to gather important data on oil reserves, geological phenomena, and climate change. This data is brought 'back' to the respective capitals, where policies are shaped according to it (Ibid., p. 203). A similar mechanism is noted by Crampton who calls these mapping projects undertaken by states "government cartography" (2009, p. 845).

The term 'government cartography' also hints at the second purpose served by natural scientific practices of mapping and surveying the Arctic. These practices are not just constitutive of the geopolitical Arctic space,

[4] A particularly illustrative example of a discourse shaped by political interest is revealed in Kristoffersen's (2014) analysis of the Norwegian framing of Norway's petroleum extraction opportunities in its 'High North'.

but also function as a way to assert sovereignty of and in a given area. The very act of mapping is a way to make the presence of the state known and to signal the intention to claim a certain territory. This "scientific nationalism" (Bruun & Medby, 2014, p. 919) is a way to appear powerful through scientific accuracy and objectivity in the face of competing performances of sovereignty. The repetition of scientific exploration becomes a way to reaffirm the cartographic understanding espoused by the relevant government (Ibid., p. 919).

In examining cartographic knowledge production, much of the literature again turns to Foucault to understand its deeper geopolitical value. The idea that knowledge is power (the power-knowledge nexus) is central in Foucauldian analyses, and applying it to cartographic knowledge production, a third effect of this cartographic knowledge becomes clear; Making territory calculable, and thereby legible, is key to claiming it and governing it (Dodds, 2010, p. 66). As Hannah notes, a central moment in the process of claiming territory is when this territory is inscribed with "basic systems of geographical reference that allow knowledge about populations, resources and activities to be indexed to specific locations, and hence make territory readable" (in Dodds, 2010, p. 66).

Examining the 'geo' of geopolitics

Three important purposes and effects of cartographic knowledge production have thus been identified by the literature. However, the effects and consequences of the production of cartographic knowledge cannot simply be summed up in these three broad points. In the process of examining this knowledge creation closely, more nuances appear. As Steinberg (2010) notes, cartographic knowledge has not always been and is not always produced for the purpose of claiming and possessing land or resources. Sometimes it is produced solely for making navigation possible – a purpose which includes an acceptance of the inability to fully know the place or the region (Steinberg, 2010, p. 82)[5]. To this Steinberg adds another point of nuance; while he agrees that a map serves to construct the world, he also believes that maps are *representations* of some geographical physicality, even though they often present themselves as actually *being* that same physical space (Ibid., p. 83).

In order to fully understand the interplay between international law, the claim to sovereign rights, and the role of natural science in the Continental Shelf Project, we therefore need to theorize the relation between the scientific act of mapping and the legal process involved in the cartographic 'reality' that is produced. Steinberg & Peters (while citing Elden, 2013) emphasize the need to "bring the geophysical into relation with the geopolitical, thinking about the materiality of the 'geo' in terms of how we think about the question of geopolitics" (2015, p. 252). To Steinberg & Peters (2015) then, it is not enough to examine discourses on Arctic territory and practices of cartography production. We also need to understand the role of the physical 'facts' such as water, rocks, sediments and crust composition, and how these shape politics or are perhaps shaped by political interests.

[5] For an investigation of the role of 'the unknown' in the Kingdom of Denmark's Arctic policy, see Mortensgaard (2017).

An interesting example of this is given by Jacobsen & Strandsbjerg (2017, p. 22) who note the difference between the concept of the EEZ, which is a purely legal notion, and the process of claiming an extended continental shelf which necessitates the support of scientific data. The fact that UNCLOS refers to geological and geo-morphological features as important determinants in the process of claiming an extended continental shelf is based on the assumption that "'nature' provides a unified presence and science represents this with a consensual voice" (Ibid., p. 22). That is, however, not necessarily the case in the bid for new territory, which is a political decision and a political project. It would not be unreasonable to venture the proposition that scientific accuracy and objectivity is moderated in this process, what Jacobsen & Strandsbjerg call "politicized" (Ibid., p. 22). In a previous interview, Strandsbjerg even asked the director of the Danish Continental Shelf Project about this dynamic, and received a reply that suggested that the project was of course guided by political wishes (Ibid., p. 22). What this means, is that the relation between international law and scientific data might not be as straightforward as it is often presented. Further, it indicates that politics plays a role in all of this and that this role needs to be uncovered in order to understand the dynamics of the process of claiming an extended continental shelf. While Strandsbjerg (2012) has already gone some way in examining this in his article on cartopolitics, geopolitics and boundaries in the Arctic, his investigation does not bring specific insights on the claim north of Greenland because the claim had not been finalized when the article was published. Further, the article lacks an empirical foundation and therefore misses key points that are brought to light when the claiming of an extended continental shelf is examined in detail.

The existing literature thus provides a number of important insights. However, the relation between claiming Arctic territory and sovereign rights, and the act of representing the Arctic region through scientific cartography remains undertheorized by the literature. In order to understand how Denmark-Greenland has claimed a very large area in the Central Arctic Ocean and how it 'knows' where to draw this territorial boundary, a theoretical framework, which brings together the notions of 'territory', 'sovereignty', 'geography and geology', and 'cartography' is needed. I believe that Jeppe Strandsbjerg's (2010) contribution does just that, as it helps us understand the central role of cartography in the process of making space and – by extension – claiming sovereign rights. Moreover, the nature of the research questions demands a theoretical framework which can incorporate both 'how-possible' questions and 'why/how' questions, i.e. 'understanding' and 'explaining' in Hollis & Smith's (1990) famous dichotomy. Due to its Bruno Latour-inspired theorizing, Strandsbjerg's framework should be well-suited to this, as is presented below.

Theoretical lens: The 'cartographic reality of space'

Jeppe Strandsbjerg's (2010) *Territory, Globalization and International Relations* takes its cue from the globalization literature, which posits that the nation state is disappearing in the face of a compression of time and space brought about by new technologies, among other developments. Strandsbjerg's contribution is in some ways one long rebuttal of the claim that territory is disappearing as a structuring concept in the world. While this globalization debate is indeed interesting, and not entirely irrelevant to the research question, the main theoretical argument of Strandsbjerg's book is what will contribute to answering the three research questions and the overall research purpose laid out in the introductory section.

Strandsbjerg argues that we live in a "cartographic reality of space" (2010, p. 4). By this he means that the spatial 'reality' we live in is a result of cartographic practice, and that this spatial reality has changed fundamentally as cartographic practices have developed historically. In order to understand how the state has changed spatially over time, we first need to understand how cartography has changed. Cartography – understood as the technology and practice of surveying a particular spot and drawing maps based on this data – underwent a fundamental change in Europe between the middle ages and the renaissance and it is this transformation in cartography that has enabled the modern-day production of political space (Jeppe Strandsbjerg, 2010, p. 4). Strandsbjerg traces this development historically in an interdisciplinary contribution, drawing on Historical Sociology, Geopolitics and International Relations.

Causality in Strandsbjerg's framework

It is important to underline – as Strandsbjerg does throughout his book (see 2010, pp. 5; 64; 116) – that the enabling effect of cartography should not be understood as a causal explanatory value. Cartography, in this theoretical framework, is part of larger societal developments and therefore it is not cartographic development on its own that leads to the spatial developments identified by Strandsbjerg. However, Strandsbjerg does ascribe a degree of analytical autonomy and causality to *space* in order to be able to identify its impact on concurrent social practices (Ibid., pp. 47–48). By focusing on the historical development of cartography, rather than analyzing which historical changes preceded the change in cartographic techniques, it becomes possible to study space as a social construction, and in turn, to understand the impact of space on other social practices. Ultimately what Strandsbjerg wants to show is "how the establishment of cartographic spaces *preceded* and *enabled* a novel relationship between space and politics" (Ibid., p. 5, my emphasis). Strandsbjerg aims to understand the development of 'space' and its relation to political concepts such as territory and sovereignty, and by looking specifically at cartographic history, he is able to study space as a structuring concept (Jeppe Strandsbjerg, 2010, pp. 47–48). Understanding space and our spatial reality in this way, allows us to understand how space might affect and is connected to other political concepts such as territory and sovereignty. Strandsbjerg is not denying that space is a "historically contingent category" (Ibid., p. 47). But he is arguing that the cartographic developments, which led to certain conceptions of space, preceded key developments in the relation between territory and sovereignty:

> It was cartography specifically that established and transformed the material environment in a way that made overseas planning and coordination of space possible in a way it had not been before. It was cartography that rendered space autonomous and made possible a territorial definition of society that had not existed before (Jeppe Strandsbjerg, 2010, p. 15).

In this way, there is causality to cartographic space, but not in the sense that cartographic space caused the modern system of sovereign, territorial states by itself. But it did enable and precede a certain formulation of the relationship between space and sovereign territory, and it is the development of this formulation, which can be revealed by isolating cartographic developments and focusing on cartography as a social and scientific practice.

Ontology in Strandsbjerg's framework: Avoiding the 'battle of the science warriors'

The argument that we live in a 'cartographic reality of space' also entails certain ontological assumptions. Strandsbjerg finds that the existing accounts in the literature of what kind of 'reality' space is, has a tendency to fall into pre-existing and opposing ontological camps. He takes issue with the literature's reproduction of well-known debates between the classical/modern and post-structural/post-modern accounts in both Geopolitics and International Relations. These opposing camps represent different views of what reality is and whether/how it can be known; where the modern accounts see 'reality' as being 'out' there and as something that can be identified and known, the post-modern or post-structural accounts stipulate that 'reality' is constructed through discourses and practices and a 'true' reality 'underneath' discourse can never be known. This goes back to the Foucauldian approaches touched upon in the literature review.

In both camps, argues Strandsbjerg, "physical, or geographical space, is made redundant" (2010, p. 35). In the accounts where political subjects are understood as acting on natural pre-given spaces, the physical space is understood as a constant, which does not require interrogation because it is seen as an unchangeable premise of the world. On the other end of the scale, the post-structural accounts also neglect to examine physical 'objects' because in these accounts there are no objects outside discourse, so these objects can only be known by interrogating discourses on them, because in a sense they are these discourses. That is, state territory tends to be seen as a product of social forces or it is considered a natural space, which is simply 'there' – in both cases, it remains unexamined, yet assumed (Ibid., p. 35).

Where is this critique leading Strandsbjerg? To Bruno Latour's 'science studies'. Through the use of Latour, Strandsbjerg is able to conceptualize space as something which is both 'social' and 'natural'. The "battle of the science warriors" (Ibid., p. 51) is not helpful for understanding space and only serves to repeat old, false dichotomies between nature and culture, and between the realists and the post-structuralists. According to Latour, there is no battle and the two camps need not see each other as opposites. The way to overcome the rift, is to give agency to 'nature', i.e. non-human objects; It is not only humans and human-made social systems that ascribe meaning to the world, but also non-human objects, which can do things or influence meaning-making. This is not to ascribe consciousness or the power of decision to dead objects, but to say that they exist in certain ways and change in certain ways, which are outside the control of humans and as such they have agency of their own.

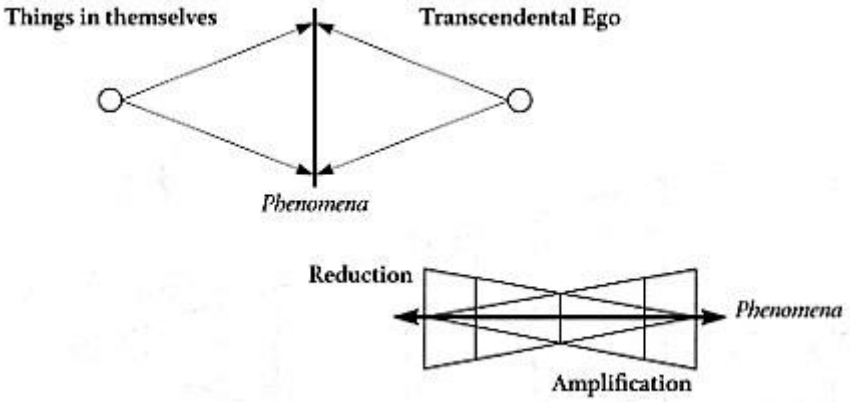
Latour (and Strandsbjerg, 2010, p. 59) illustrate the idea of humans and non-humans existing as a collective with the debate on gun control in the US (Latour, 1999, pp. 176–177). Briefly summarized, the following two statements both hold some truth, but simultaneously neither tells the full story: "Guns kill people" (Latour, 1999, p. 176) and "Guns don't kill people; *people* kill people" (Ibid., p. 176). The gun does not kill anyone without a human being picking it up and pressing its trigger. But at the same time, if the gun was not present, the act of aggression would not take place in the same way, with the same degree of injury. This is the collective; the reality of someone being shot with a gun is only possible when the human and non-human act as a collective. This is, of course, a simple example, but should still serve to illustrate why the human, the non-human and the reality, the collective they together form, needs to be examined. The point is that the human is not the same agent as the human with gun is, just like the gun held by a human is not the same as the gun sitting on a table. According to Latour, they together form a new kind of agent – they are both something else than before the human picked up the gun (1999, pp. 178–179) – and together they act as a collective; the human does not act as a human only, but as a human with a gun.

This notion of a collective of humans and non-human is captured in the idea of *circulating referents*. These are phenomena which circulate in a continuous process between humans and non-humans (Jeppe Strandsbjerg, 2010, p. 59)[6]. Space is such a circulating referent or phenomena, and is thus affected by both humans and non-humans. Space as a phenomena "*circulates* all along the reversible chain of transformations" (Ibid., p. 59, original emphasis), and this *chain of transformations* is the process through which scientific facts are established in a number of stages of *reduction*; namely observation, recording/transcription, data processing and presentation. At each stage the referent obtains "greater 'compatibility, standardisation, text, calculation, and relative universality'" (Latour, 1999 in Strandsbjerg, 2010, p. 59)[7]. At each stage of *reduction,* the raw data of 'nature' is transformed into something which is increasingly compatible with already established systems of knowing and systems of meaning; what Latour/Strandsbjerg call "established centers of calculation" (Jeppe Strandsbjerg, 2010, p. 59). Moreover, the chain of transformation is *reversible*, i.e. by examining and understanding the different stages in the chain of transformation, it should be possible – in a sense – to trace backwards to the 'original' to understand the agency of the non-human and how it interacts with human agency along the chain of transformation to form the spatial reality that we encounter(Latour, 1999, p. 69). The below figure 2 shows on the upper left the Kantian version, as identified by Latour, of how phenomena should be understood; as things in themselves meeting the active human mind at a point, which illustrates how they exist in our world. The Latourian version is illustrated at the bottom right; a phenomena is something that circulates between reduction-universality and amplification-particularity. The arrow going in both directions shows the reversibility of the stages of reduction.

[6] Latour equates the idea of a referent with the truth-value value sought after, so that what circulates along the chain of transformation is the thing/phenomena/existence the researcher is trying to say something truthful about (Latour, 1999, p. 69).

[7] Latour writes that at each stage in the chain of transformation something is gained and something is also lost; particularity and detail are lost, while new properties such as universality and explanatory power are gained (1999, p. 70)

Figure 2: Kantian phenomena vs Latourian phenomena[8]



The production of reality in the Latourian sense also depends on a *centre of accumulation* (Jeppe Strandsbjerg, 2010, p. 99). This is not to be confused with the centers of calculation mentioned in the above paragraph.[9] Where the centers of calculation refer to the more or less universal systems of knowing, epistemic rules and ways of giving meaning to something, the centre of accumulation is, as the term indicates, a place where knowledge production takes place and where data is brought together to produce a consistent whole. The centre of accumulation, therefore, refers to scientific expeditions and projects being conceived and planned, and to the coming-together of the different disciplines involved in the project. It is where the data is processed, analyzed and synthesized into a meaningful whole (Jeppe Strandsbjerg, 2010, p. 99). This meaningful whole, produced at the centre of accumulation, then should ideally be compatible with the centers of calculation.

This leads to the key point that the 'reality' of space is "constructed as an assemblage between human and non-human elements" (Strandsbjerg, 2010, p. 51). So space is still constructed, but not only by human agency. It is constructed as a coming-together of the landscape and its physical elements, technologies of calculation, human perceptions and discourses, and the accepted systems of knowing. Recognizing this, leads Latour and Strandsbjerg to study the practice of science, and more specifically, in Strandsbjerg's case: Cartography. By diving into the scientific processes behind cartography, we can come to understand the 'cartographic reality of space', which is an assemblage of human and non-human factors processed and tied

[8] Figure 2 appears in Latour (1999, p. 72), but is in this case taken from Heyward (2011).

[9] It seems that Strandsbjerg does actually use the two types of centers interchangeably. At least he refers to both of them as physical sites where data is brought together and combined in a "map-makers' workshop" (Jeppe Strandsbjerg, 2010, p. 61), "a laboratory" (Ibid., p. 61) or "a 'hub'" (Ibid., p. 99). The understanding of the difference between the two centers, which is employed here, is therefore my interpretation of Strandsbjerg's text. The following quote suggests that the *centre of calculation* does refer to epistemic rules for meaning-making of scientific data: "phenomena are what circulates all along the reversible chain of transformations, at each step losing some properties to gain others that *render them compatible* with already established centers of calculation" (Latour (1999) in Strandsbjerg, 2010, p. 59, my emphasis).

together by (natural) scientists. The quality of doing Latourian science studies lies in its ability to reveal how the reality we can comprehend comes about in a number of stages, where non-humans become understandable and comprehensible through words, images, charts, tables and maps. Latour himself phrases this idea simply: "Nonhumans can be loaded into discourse exactly as easily as ministers can be made to understand neutrons" (1999, p. 96).

Cartographic developments: Producing autonomous and abstract space

But what do Latour's science studies and the 'cartographic reality of space' have to do with claiming an extended continental shelf in the Arctic Ocean? If the reality of space is established through cartography, then the particular mode of cartography (i.e. its reversible chain of transformation which transforms observations into universal facts through different stages of reduction) conditions how territory can be organized. The final product of the cartographic chain of transformation, i.e. the map, conditions how political space is established and organized and in this way "there is no spatial reality outside the map; there is no natural foundation below and besides the cartographic reality of space that we can fall back to" (Jeppe Strandsbjerg, 2010, p. 69). This is not to say that there is no reality outside discourse, as Foucauldian approaches would claim. As explained, the cartographic reality of space is established as a coming-together of human and non-human elements, and so it is not 'pure' construction in the post-structuralist sense. But it is to say that the reality outside the map is not *spatial* and that the mode of map-making – the particular chain of transformation producing the map – is determining of what kind of spatial reality is produced (Ibid., 2010, p. 69). In this way, a map is not only a representation of a geographical physicality, as noted by Steinberg in the literature review (Steinberg, 2010, p. 83). Rather, in mapping something, a specific spatial reality is produced, which was not comprehensible as spatial before the map was made; its beginning and end, as well as, its shape could not be understood in the same way before the map.

The argument that the map (i.e. the cartographic space) enables new ways of establishing and organizing such political concepts as territorial sovereignty is unfolded and substantiated in Strandsbjerg's analysis of the historical development of cartographic practice, i.e. mapping techniques. The European Renaissance is key to this transformation, because the techniques developed during these years made it possible to tie sovereignty to a specific territorial space. Medieval cartography, exemplified in the *mappaemundi*, focused on representing religious and historical convictions alongside geographical understandings. The *mappaemundi* shows both the garden of Eden and specific geographical places such as Rome on the same map, but lacks any kind of territorial demarcations. As such this map says more about which places and what kind of authority were considered the most important, and is not a tool for navigation or conquest (Strandsbjerg, 2010, pp. 75–76). An early example of a map used for navigation, is the *portolans* which was developed and used by Mediterranean sailors in the late thirteenth century. It described specific physical features of the coastline and the sea known to the sailors and merchants, and in this way the *portolans* was very much a product of local knowledge and for local use, rather than a result of geometric rules and grand aspirations of mapping the world.

According to Strandsbjerg, the translation of Ptolemy's *Geography* into Latin in the beginning of the fifteenth century was one of the factors that enabled a (re)introduction of scientific cartography into Europe. Further, the 'discovery' of the Americas in 1492 underlined the need for mapping techniques which were not based on experience or divine authority, but rather on geometric parallels, as prescribed by Ptolemy's framework. Further, Euclid's geometry also inspired changes in cartography in that it (re)introduced lines of latitude and

longitude and rendered space "abstract, geometric and homogenous" (Ibid., p. 79). Finally, advancements in techniques of calculating distance also contributed to this new cartography (See Ibid., p. 80). The Spanish master map, the *Padron Real* became one of the first attempts at using this new cartography in an effort to map the 'new world' and to bring together disparate parts of the world (Ibid., p. 107). Cartography thus became something that could be applied everywhere, irrespective of prior knowledge of a particular location. It was no longer based on localized understandings of the landscape or divine authority, but rather on general, theoretical rules – in this case a grid system – into which new places could be mapped in the correct size and distance to other (already known) areas (Jeppe Strandsbjerg, 2010, pp. 79–80).

This change in cartographic practice is important because it simultaneously enabled the drawing of boundaries and the coupling of sovereignty to territory. The development of mapping techniques which conceptualized space in a geometric way that could be applied everywhere, made it possible to map large areas in a uniform way. This is a big contrast to medieval territoriality which rarely contained clear boundaries, and where territories often overlapped. As Strandsbjerg notes,

> Territory did not play the same role in defining the domain, but followed rather as a result of 'jurisdictional sovereignty' determining the relationship between subjects and the ruler (Sahlins 1989). Control of the territory was generally maintained by controlling the towns and, not least, the castles of the country (2010, p. 81).

Territorial control was ensured by personal bonds of allegiance between the ruler, the lords, and the subjects – bonds which had to be constantly nurtured, confirmed and reproduced with generational changes. With the advent of the scientific map, space suddenly became a feature which could be encircled quite accurately, and which did not change with changing rulers and their personal bonds. Space thus achieved a degree of autonomy – it could be known on its own.

Cartographic developments also enabled a head of state to meet another head of state to divide large territories between them. By using maps formed from identical principles of mapping, they could divide territory without any prior knowledge or personal experience of the area in question. The Treaty of Tordesillas between Portugal and Spain illustrates the possibilities entailed in the new mapping technique. The treaty, which is from 1494, divides the Atlantic Ocean into two spheres; a Portugese one, encompassing everything discovered or to be discovered east of a line of longitude located app. 2000km west of the Cape Verde Islands. Everything west of this line would belong to Spain. This shows the abstraction of space, i.e. the idea that the whole world can be sorted into a grid system with no pre-inscribed signifiers, and that this grid system can then be used to divide up this 'empty' world (Strandsbjerg, 2010, pp. 93–94). The treaty's abstract knowledge of space was later decisive in allocating for instance Brazil as belonging to Portugal, and it was thus the "cartographic reality of the world that came to decide 'the reality on the ground' and not the other way around" (Strandsbjerg, 2010, p. 94). As is well-known, solving political disputes over landmass through maps remained a popular technique with European colonial powers for the next centuries, as is still evident form the infamous straight lines on the African continent and in the Middle East.

With the grid system of longitude and latitude, the coordinates of a location would describe the same exact place to a Frenchman and a Brit, thus constituting a "universal language of space" (Strandsbjerg, 2010, p. 83). The new mapping technique constituted space as empty and thus allowed the inscription of particular meanings onto this space, such as political and administrative units (Ibid., p. 84). Further to this, bringing newly discovered land 'home' – securing them as possessions of the state – was in many ways enabled by the geometric map and was of vital importance in the contest to colonize the world. The *centers of*

accumulation brought together insights from different disciplines, such as navigators, cartographers and printers in order to produce complete maps. These maps could then be used to go back to the newly discovered places – a necessity in the process of colonizing new lands. Bringing home such distant places by mapping them made it possible to repeatedly send new expeditions and missions to this newly acquired land, thus enabling "action at a distance" (Ibid., p. 99, see also p.107).

The geometric map is therefore an important development because of its transformation of 'space' into an autonomous, abstract concept. The geometric map makes space 'real'. Through the chain of transformations, the landscape – its contours and distances – is processed by humans to produce a map that makes space something tangible and perceivable. And this realness of space makes it a domain for politics, and by extension a domain for the politics of the state. It enables a political identity which is not based on personal bonds and location-specific understandings of space, but one which is based on an abstract, autonomous space that can be pointed to on a map (Strandsbjerg, 2010, p. 86). This echoes the assertion that cartography makes the Arctic "a space of the real" (Dittmer et al., 2011, p. 203) as noted in the literature review.

Tying sovereignty to territory: Exemplified through the mapping of Denmark

The cocktail of a real, autonomous space mixed with a state apparatus, serves to produce the notion of state space – or what we usually call territorial space. This becomes an important ordering principle in the modern international system of states. As Strandsbjerg notes, without the autonomous and abstract version of space, which is produced through scientific cartography, it would have been impossible to "give space primacy as a defining dimension of the state, providing it with a clear territorial identity that allowed for self-reference in terms of an abstract geo-body independently of the actual rulers of the state" (Strandsbjerg, 2010, p. 86).

Territorial space is cartographic space, but from a state perspective; "modern state territory is first and foremost a cartographic construction" (Strandsbjerg, 2010, p. 87). This underlines the central point in Strandsbjerg's argument, namely that cartographic space *pre*cedes the territory, because quite simply, without the map it would be impossible to conceive of a finite territory as spatial. Returning to Latour and the ontological points covered previously, it should hopefully be clear that following Strandsbjerg's argument is to think of a map not simply as a tool for representing space, but rather as a mediator. A mediator which involves both humans and non-humans, and which serves to establish a certain spatial reality (Strandsbjerg, 2010, pp. 87–88). The importance of the map is also supported by the fact that European rulers increasingly sought to map their own territories and in this way claim authorship of the cartographic reality of their realms. Between 1450 and 1650, the new scientific cartography "enabled the representation of a permanent continuous territory which came to signify the spatial body of the state" (Jeppe Strandsbjerg, 2010, p. 122). In this way, referring to a particular state gradually came to signify the territory over which it had sovereignty, rather than the territory that could be claimed as a result of the ruler's personal bonds.

To exemplify this development and the role of cartography in connecting concepts such as state, territory and sovereignty, Strandsbjerg uses Denmark as a case. This case is focused on Denmark proper[10] and shows how crucial developments in the mapping of Denmark between 1450 and 1660 are connected to key developments in its transformation towards becoming a centralized state, which was much more integrated in the European state system. Prior to 1450 the extent of the kingdom was determined by the king's personal bonds to local lords and the extent to which he could assert this sovereignty over his subject through the lords (Jeppe Strandsbjerg, 2010, p. 127). The territory itself was controlled through the possession of castles and fortresses, which was also where the tax collection took place. However, the church controlled many of the Danish castles and so territory was a patchwork notion, which was not particularly useful for describing the king's power or the extent of his lands (Jeppe Strandsbjerg, 2010, p. 128).

With the development of geometric cartography, it became popular for European states to undertake national mapping projects. Even though 1553 marks the year where a Danish king first ordered a map of the realm to be produced, a complete and general map of Denmark was not finished until 1650 for King Frederik III due to various complications. This offered a view of the entirety of Denmark proper, assembled on one sheet of paper and 'authored' by the state. It became possible to know the state's territory by looking at a map, which was authored and possessed by the state in the capital, and this in turn made travelling around the country to assert power and understand the land redundant. Moreover, it enabled key reforms to be made, e.g. in the taxation system, in the planning and building of new roads and in creating a unified law for all the territory in 1683 (Jeppe Strandsbjerg, 2010, p. 144). In this way, space as a concept was increasingly adopted by the state and eventually came to be conditioned by the state as it took over authorship of cartography (Jeppe Strandsbjerg, 2010, p. 146).

Simultaneously with the change in cartography, a change in the notion of 'the state' was also underway. King Christian III, ruling approximately a century before Frederik III, made a number of administrative and political changes which served to centralize power at the capital and to disconnect the concept of 'The Crown' from the physical body of the king. Among other initiatives, Christian III imprisoned key members of the very powerful catholic church in Denmark and made the nobility into bureaucrats who were representatives of the king, rather than independent allies of the king. This served to instate a changed concept of the state, that increasingly came to signify an apparatus of power, which was not the people, nor the body of the king, but much more of an institution with the ability to survive independently of the particular head of state. This transformation followed similar trends across Europe (Strandsbjerg, 2010, p. 135). The new, independent notion of 'The Crown' depersonalized sovereignty, as it was no longer tied to the specific ruler in power, but came to exist on its own. As Strandsbjerg notes, it was "the notion of sovereignty gradually abstracting from the king's body which would be attached to a specific territory (…), and hereby promote the spatial identity as a state" (Jeppe Strandsbjerg, 2010, p. 136).

To sum up, space became autonomous in Denmark through the map, and importantly this space was increasingly authored and thus 'known' by the new, depersonalized version of the sovereign state. So, seeing these two developments in tandem, we understand how it became possible to identify the sovereign state

[10] I.e. excluding Schleswig & Holstein, Greenland, Iceland, the Faroe Islands, Norway, Trankebar in India and the Gold Coast possessions.

in terms of its territorial space – or as we mostly talk about it today, simply by its 'territory'. When we today point to Denmark on a map, what we are actually saying is: This space is Danish territory over which the Danish state (i.e. 'the Crown') has sovereignty. With the example of Denmark, Strandsbjerg illustrates the role of cartography, and he once again underlines his initial point: This is not an argument of causality, but one of condition. Cartography alone is not responsible for all major changes in 16th and 17th century Europe, but very important elements in these changes are conditioned by the development of the geometric map (Strandsbjerg, 2010, p. 144). This theorization of the diachronic relationship between cartography, space, territory, and sovereignty helps us identify what the role of cartography has been in creating a 'reality' which is both geographical and political, and to this days lays the ground for essential ordering principles of the international system. How this conceptualization of cartography applies to the Continental Shelf Project will be discussed in the empirical section. An operationalization of the theory is of course necessary in order for it to be useful in the analysis – this is described in detail in the chapter on methodology. First, however, an introduction to the United Nations Convention on the Law of the Sea is necessary, for the operationalization and analytical section to make sense.

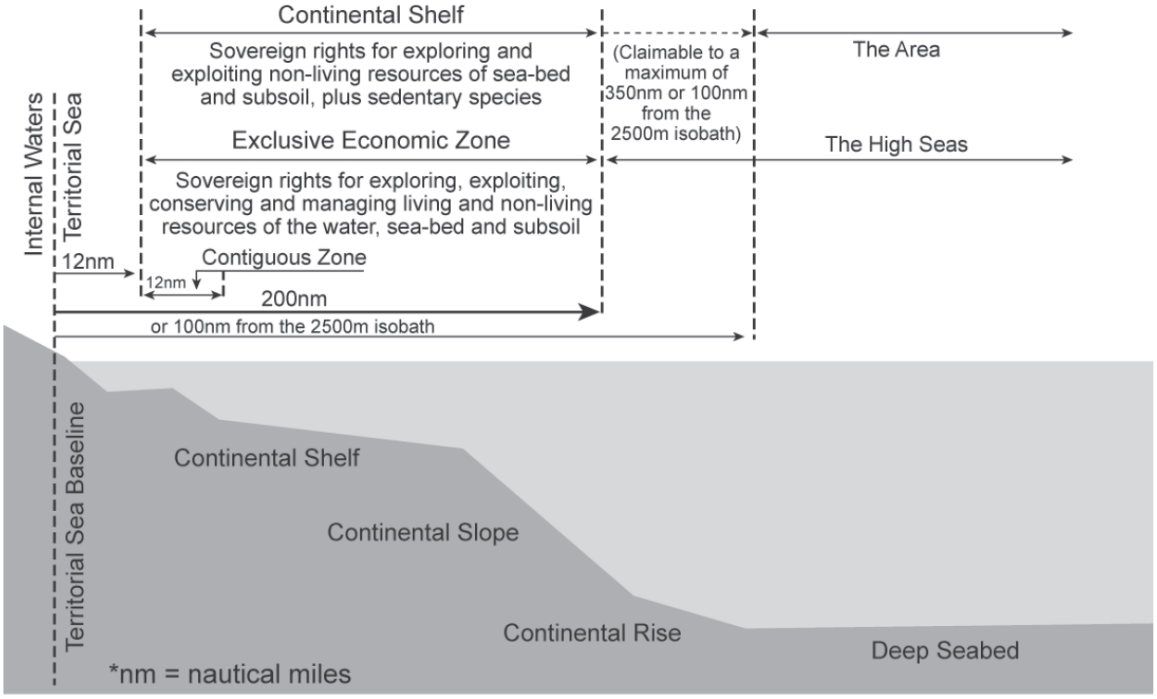
The United Nations Convention on the Law of the Sea: Article 76

The United Nations Convention on the Law of the Sea (UNCLOS) has had its current form since 1982, when it was adopted and signed. As UNCLOS entered into force in 1994 it also led to the establishment of three new UN institutions, the most important for the purposes of this investigation being The Commission on the Limits of the Continental Shelf (CLCS). It contains 320 articles, covering a wide variety of topics, including the definition of the continental shelf, which is specified in article 76. This article has tellingly given name to the website of the Danish Continental Shelf Project, which can be found on www.a76.dk. Moreover, the five Arctic littoral states all signed a declaration in 2008, the Ilulissat Declaration, in which they confirmed their commitment to UNCLOS and their intention to solve any overlapping claims by peaceful means (2008 Ilulissat Declaration). Noteworthy in this context, is the fact that that one of the five Arctic littoral states (the A5), namely the United States of America, has yet to ratify UNCLOS. The Convention is extensive and therefore only the relevant part VI, and in particular article 76 is introduced here. First, the six maritime zones as defined by UNCLOS are explained, after which the section turns to the provisions of article 76, including its specific terms and interpretive issues.

Maritime zones and rights

As Rothwell (2014, pp. 21–22) notes, UNCLOS divides the oceans into six different zones of increasing distance to the shore: 1) territorial sea, 2) contiguous zone, 3) exclusive economic zone (EEZ), 4) continental shelf, 5) deep seabed/the Area, and 6) the high seas. These are shown in figure 3 below.

Figure 3: Maritime zones and rights according to UNCLOS[11]



As shown in figure 3, the territorial sea extends outwards from the territorial sea baseline to 12 nautical miles (nm).[12] The territorial sea entails sovereignty for the relevant state over the airspace, water surface and column, and seabed and subsoil. The contiguous zone is a jurisdictional zone, and does not refer to sovereignty as such. It extends out to 24 nm.[13] The EEZ, on the other hand, is an important zone with regards to resource exploitation. It extends outwards to 200 nm from the territorial sea baseline, and it confers sovereign *rights*[14] onto the state of "exploring and exploiting, conserving and managing the natural resources,

[11] Image from Rothwell (2014, p. 21)

[12] Except for Greenland, where the territorial sea is still limited to the previous limitation of three nm. This is a matter of formalities not being in place, according to informant Jørgen Lilje-Jensen, not a point of political disagreement.

[13] 1 nautical mile is 1.85 kilometers.

[14] The concept of sovereign rights means "exclusive access to non-living resources such as oil and gas, as well as the living organisms belonging to sedentary species" according to Jensen (2015, p. 228).

whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil" (United Nations, 1982, pt. V, art. 56, para. 1a). This means that the relevant state has the rights to valuable resources such as fish stocks, oil and natural gas within the EEZ. Sovereignty does not, however, extend into the airspace and other states have the right to pass through these waters. As such, sovereignty in this context means that the state has the exclusive right to exploit the resources and whether or not it will allow other actors or states to engage in the exploitation (Jensen, 2015, p. 228).

The fourth type of maritime zone, the continental shelf, is where it gets more complicated. As a starting point, the continental shelf of all sovereign coastal states extends as far as the EEZ, i.e. 200 nm. The continental shelf refers to the seabed and subsoil only, and gives sovereign rights "for the purpose of exploring it and exploiting its natural resources" (United Nations, 1982, pt. VI, art. 77, para. 1). Consequently, the continental shelf does not give sovereign rights over fish stocks, but it does give the sovereign state the right to oil and natural gas or other resources on or below the seabed. Central to the juridical concept of the continental shelf is the possibility of claiming an extended continental shelf.

An extended continental shelf can be claimed if the sovereign state provides sufficient scientific data to prove that its continental shelf extends beyond the 200 nm. By submitting data to the CLCS, a state can claim an extended continental shelf extending up to 350 nm from the territorial sea baseline or 100nm from the 2,500 meter isobath[15]. The rules for determining the exact extent are complex and will be explained in the paragraphs below.

The deep seabed – the fifth maritime zone – is called 'the Area' in UNCLOS-terms and it refers to that part of the seabed and subsoil which extends beyond the territorial sea and the continental shelf – extended or not. Correspondingly, the high seas is the part of the water column, which is not part of any state's territorial sea or EEZ[16] (Rothwell, 2014, p. 23). In other words, where the Area refers to the 'common heritage' seabed and subsoil thereof, the high seas refers to the 'common heritage' water column.

UNCLOS' article 76: Opportunities and constraints

Article 76 itself is overseeable as it fills up little more than a page and contains only 10 paragraphs. It is an unusual mix of legal terminology intermingling with scientific data requirements. It begins with a definition of the continental shelf as that which

> comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance (United Nations, 1982, pt. VI, art. 76, para. 1).

[15] An isobath is a line signifying a certain depth.

[16] Some high sea rights are also applicable within the EEZ, see Rothwell (2014, p. 23).

Accordingly, article 76 allows for two ways for a coastal state to establish the outer limit of its legal continental shelf; the 'natural prolongation' criteria or the geographical-distance criteria. In the latter case, the continental shelf is not based on the nature – the geology and geomorphology – of the shelf, but extends only up to the EEZ, and in this scenario, article 76 seizes to have much further relevance and there will be no CLCS submission process. The natural prolongation criteria on the other hand, is very much based on the nature of the shelf and it is this scenario, which is relevant for the Continental Shelf Project (Jensen, 2015, pp. 228–229). In case a state opts for the 'natural prolongation' argument, it will assert a claim to an extended continental shelf, which goes beyond 200 nm.

The natural prolongation formulation allows a state to claim the part of the ocean floor and subsoil thereof, which can be scientifically shown to be an extension of its geological continental shelf. More accurately, the part that can be claimed beyond 200 nm, will extent outwards to the end of the *continental margin*. The outer edge of the continental margin, i.e. the limit of the legal continental shelf, is determined through scientific measurements of the seabed.[17]

An important point to make is that the *geological/geo-science* continental shelf is different from the *legal* continental shelf. As defined by paragraph 1 of article 76, in the 'natural prolongation' scenario, the legal continental shelf continues to the outer edge of the continental margin. The continental margin is, in turn, made up of the geological continental shelf plus the continental slope plus the continental rise. Thus, the *continental margin* is the overall term encompassing these three elements and as such, it has maintained some notion of its geo-scientific meaning (Brekke, 2014, p. 39). As Brekke notes, in UNCLOS' juridical term 'the continental shelf' signifies the "*seabed areas over which the coastal State has jurisdiction*" (2014, p. 39, original emphasis).

In order to determine exactly where the coastal state can delineate its legal continental shelf (i.e. where the outer edge of the continental margin is), a very important point must be found: *the foot of the continental slope*. The foot of slope (FOS) is the "point of maximum change in the gradient at its base" (United Nations, 1982, pt. VI, art. 76, para. 4b). This is shown in figure 4.

[17] Brekke contends that the continental shelf of the state is defined as "the natural prolongation of land territory", whereas the continental margin can be defined as "the submerged prolongation of the landmass" (Brekke, 2014, p. 40) of the state in question.

Figure 4: Foot of Slope and formula constraint lines

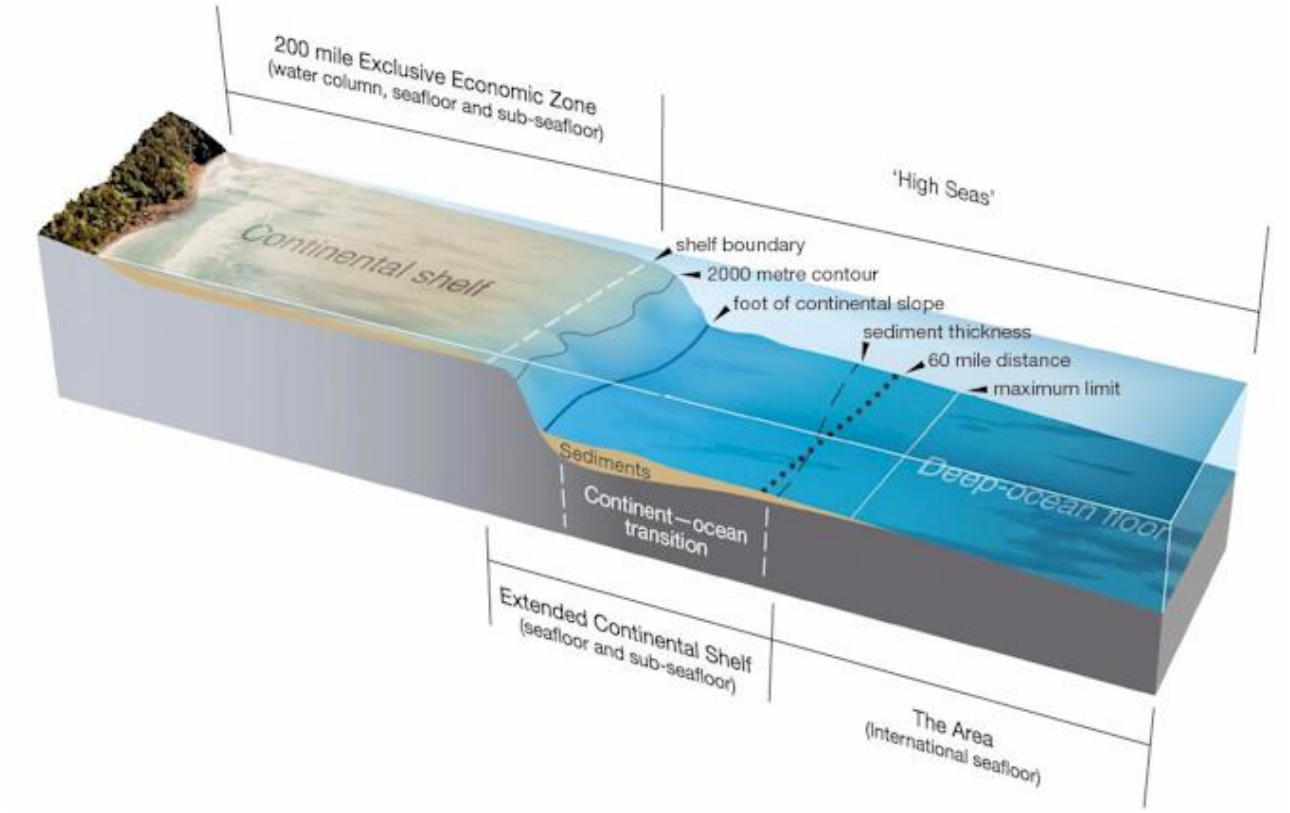


Figure 4: Showing several of the important concepts of article 76, including the foot of the continental slope and the two formulas that may be used to determine the outer delineation of the legal continental shelf. Image Taken from 2B1st Consulting (2012).

Once the foot of the slope has been found, the coastal state can choose between two different formulas which both serve to mark the outer edge of the continental margin, i.e. the outer limit of the legal continental shelf. These two formulas are known as the Hedberg formula (also known as the distance formula), and the Gardiner formula (also known as the depth-of-sediment-formula). These are also exemplified in figure 4. The Hedberg formula stipulates that the outer limit of the continental margin can be found by drawing lines of 60 nm outwards from the foot of slope, hence the alternative name 'the distance-formula'. The Gardiner formula, on the other hand, stipulates that the outer edge of the continental margin can be found at those points where "the thickness of sedimentary rocks is at least 1 per cent of the shortest distance from such point to the foot of the continental slope" (United Nations, 1982, pt. VI, art. 76, para. 4ai). In other words, at a point 100 nm from the foot of slope, the sediments much be at least 1 nm thick for the Gardiner formula to be applicable. The two formulas can be used alternatingly in a way that gives the coastal state the most extensive outer limit delineation (Brekke, 2014, p. 40).

However, the previously mentioned constraint lines must be respected, so that no matter which formula is used, the outer limit of the legal continental shelf does not exceed 350 nm from the territorial sea baseline or 100 nm from the 2,500 meter isobath, whichever is more rewarding for the coastal state (Brekke, 2014, p. 41). To complicate matters further, UNCLOS entails an important distinction, which pertains to oceanic features, seemingly detached from the landmass. This distinction is central for Denmark-Greenland's claim

north of Greenland. UNCLOS distinguishes between *submarine ridges* and *submarine elevations*. A submarine ridge is in UNCLOS' terms considered a geological feature that has developed independently of the continents, and a submarine ridge, therefore does not allow a state to go beyond the two constraint lines. A submarine elevation, on the other hand, is considered to be a direct product of continental movements. In the logic of UNCLOS therefore, submarine elevations are exceptions to the constraint lines, because they are considered to be "natural components of the continental margin" (United Nations, 1982, pt. VI, art. 76, para. 6). If a state can show that a submarine feature is in fact an elevation, i.e. a natural component of its continental shelf, then the delineation line of the extended continental shelf can presumably be drawn much further away from the territorial sea baseline.

The CLCS-process and article 76's interpretive issues

Article 76 is the source of much legal debate because key terms can be interpreted in different ways, and because precedence rulings from international courts and tribunals remain few and case-specific as Busch (2018) has noted. When this UNCLOS-specific data has been collected and processed, the coastal state must submit this to the CLCS within the 10-year deadline.[18] The Commission consists of 21 members, who are elected for five-year periods by those states party to the convention. The two main functions of the CLCS are to provide technical assistance for the coastal states during the process of making a submission, and to evaluate each submission, resulting in a recommendation or a request for more or better data[19] (Jensen, 2015, p. 230). When the coastal state has received a recommendation on its submission, it can then file this delineation with the UN Secretary General, after which the *delineation* becomes a *delimitation*, which is a recognized legal boundary line. In cases of overlaps between states, the states will typically try to negotiate how to divide the overlapping area between them, and if this fails, the delimitation process can ultimately be decided by an international court or tribunal (Jensen, 2015, p. 241).

The procedural part of claiming an extended continental shelf is thus clear. What remains unclear is how the CLCS will interpret and evaluate claims to submarine elevations and how the concept of 'natural prolongation' should be understood in general – as a juridical or a geological or geo-morphological term. As Busch has shown, the decisions taken by different international courts and tribunals on claims beyond 200 nm do not always correspond or emphasize the same elements (see Busch, 2018). It is of course important to note that the delineation process carried out by CLCS is a different process than a delimitation case decided at an international court or tribunal. It is, nonetheless, the same articles of UNCLOS that interpretations and decisions are based on and the courts have been known to use the CLCS recommendation as a basis for making its decision. In connection, some uncertainty also remains as to what kind of data is required by the CLCS for the purposes of documenting a submarine elevation. This matter is highly relevant for multiple Artic states (Brekke, 2014, p. 41). Jensen states that in continuation with the necessity to clarify what constitutes

[18] The submission cannot be considered by CLCS if neighboring states with potential overlapping claims have made an objection to this.

[19] Russia was asked to make a revised submission after its initial submission in 2001.

a ‘natural prolongation’, it remains unclear both in article 76 and in its technical guidelines exactly how to show that something is an elevation and not ‘just’ a ridge.

These uncertainties apply to Denmark-Greenland’s final claim. It covers an area running along the Lomonosov ridge all the way until 200 nm from the Russian Federation’s territorial sea baseline, and encompassing 895,541 km^2 of the Arctic Ocean.[20] This is visualized in figure 5, where the relevant article 76 zones, formulas and constraint lines are also shown. As Brekke[21] concludes, the way CLCS understands the key distinction between submarine ridges and submarine elevations will very much determine the outer limits of the Arctic continental shelves, and it is very likely that “most of the Arctic Ocean comes under the jurisdiction of the surrounding coastal states” (2014, p. 52).

[20] Brekke notes that a 2004 drilling by the Integrated Ocean Drilling Program confirmed that the Lomonosov ridge does contain continental crust and has been formed by continental rifting (2014, p. 47).

[21] Brekke has been a member of CLCS for 15 years and has also served as its Vice Chairman and acting Chairman.

Figure 5: The Kingdom of Denmark's claim to an extended continental shelf in the Arctic Ocean

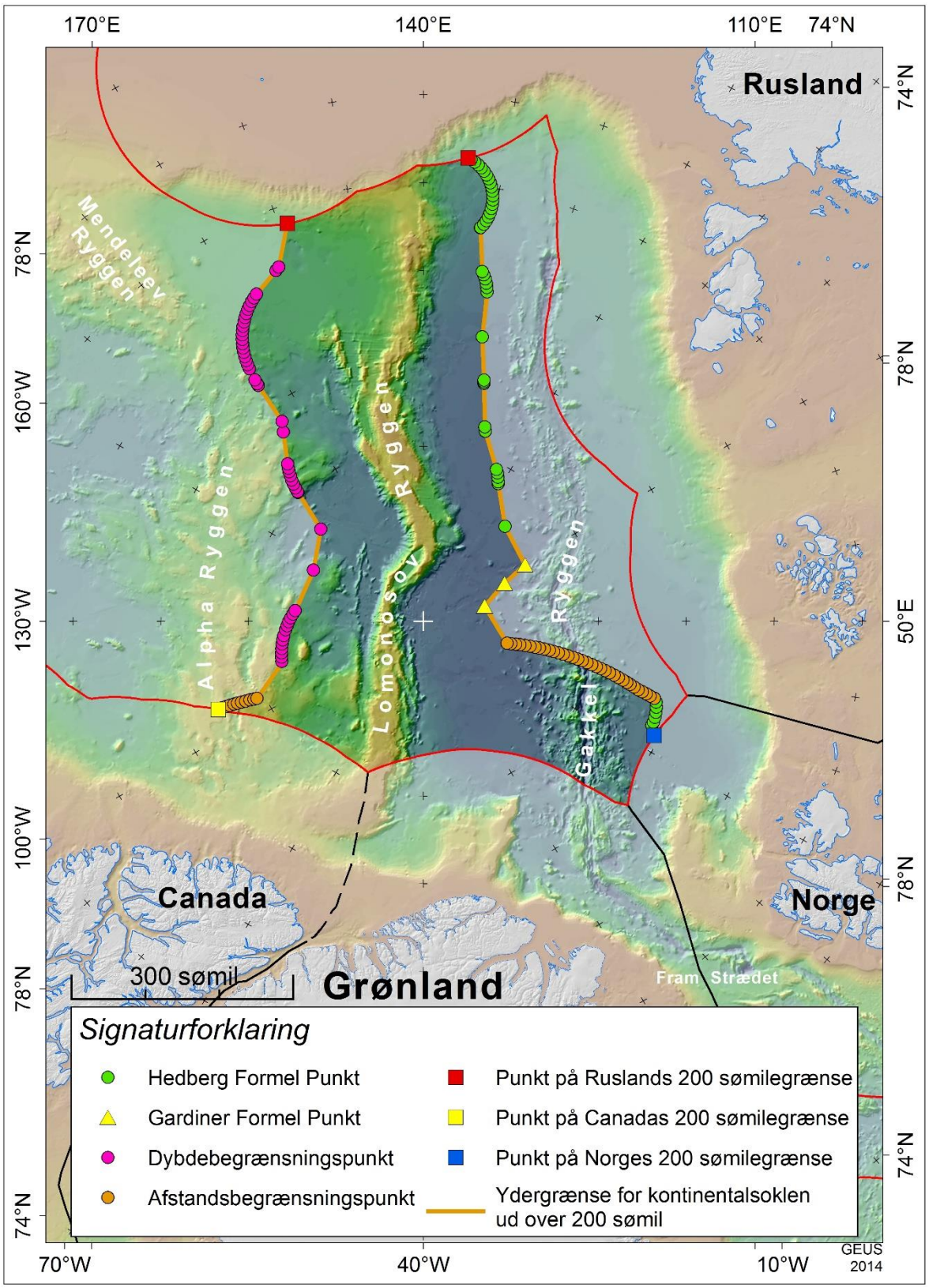


Figure 5: Taken from The Kingdom of Denmark's Executive Summary (2014). The legend translates to the following, reading the left column first: Hedberg Formula Point; Gardiner Formula Point; Depth-constraint Point; Distance-constraint Point; Point on Russia's 200 nm boundary; Point on Canada's 200 nm boundary; Point on Norway's 200 nm boundary; Outer limit for the continental shelf beyond 200 nm.

Methodology

Choosing the appropriate methodology

As laid out in the theoretical section, what Strandsbjerg – and by extension Latour – are advocating is an approach that takes into account both the human and the non-human and the 'reality' they create. As a theoretical framework it emphasizes the cartographer's individual surveying and calculations and interpretations of the data, but it also takes into account the physical existence of landmass and how this relates to structures like the state and the "established centers of calculation" (Strandsbjerg, 2010, p. 59). Thus, the theory draws on both structure (understood in the broadest sense possible) and agency and aims to avoid prejudicing one over the other. On an ontological level therefore, it is a theory that tries to avoid choosing a side in the "battle of the science warriors" (Ibid., p. 51) between the structural, holistic level and the agency, individual level.

This, held together with the theory's focus on the cartographers' production of space through the stages of reduction at the centers of accumulation, points to the need for a methodological approach that can elucidate the particulars of creating cartographic space. As Latour writes, "[t]he only way to understand the reality of science studies is to follow what science studies does best, that is, paying close attention to the details of scientific practice" (1999, p. 24). A qualitative approach will enable such close attention. A comprehensive fieldwork set-up, including participant observation, would perhaps be the most obvious choice. However, as the data gathering and processing phase is complete, this is not an option.

Layna Mosley encourages political scientists to "just talk to people" (2013, p. 28) – but preferably in a "way that is as rigorous, transparent, and ethical as possible" (Ibid.) – for instance by employing semi-structured in-depth interviews. Interviewing the people who participated in the submission process, and in this way drawing on their expertise and memory of the project, thus forms the empiricism of this investigation. Keeping in mind the need to understand how 'reality' is created as a coming-together of human and non-human agency in the stages of reduction, the most important interview persons are the scientists. Also important are lawyers from the Ministry of Foreign Affairs of Denmark, and representatives from the Government of Greenland. The specific sampling strategy is discussed shortly.

Semi-structered depth-interviewing as method

As Brinkmann & Kvale (2015, p. 108) note, the qualitative research interview is a particular knowledge-producing setting and a tool, through which empirical material takes shape as a collaboration between interviewer and interviewee. Brinkmann & Kvale identify four important aspects that should be considered when describing the contexts of interviews: interviewer, interviewee, bodies, and the role of non-humans (2015, p. 104). These are discussed in turn.

The Interviewer:

Brinkmann & Kvale identifiy three types of interview positions: The pollster, the prober and the participant (2015, p. 109). In this context I am not interested in the inner worlds of the informants, but rather in their expert knowledge, in their way of conducting their professional work, and to an extent also in their perceptions and opinions of the Continental Shelf Project. Therefore, I take the position of the *participant*, who understands the interview as a series of utterances which are produced in collaboration (be it

antagonistic or not) during the interview. These utterances can be challenged during the interview and cross-referenced in other interviews or through other channels.

Importantly, the goal of conducting the interview as a participant can be "to reach knowledge in the sense of episteme" (Brinkmann & Kvale, 2015, p. 109). This is exactly the aim of conducting these interviews; to reach an understanding of the processes behind the submission by making sense of it in cooperation with the informants. Naturally, the informant is the most active part, however, the interviewer also assumes an active role by making sure, during the interview, that her understanding of what the informant is saying is correct. Moreover, the interviewer may ask critical questions or even provoke in order to illuminate contradictions in the account of the informant (Brinkmann & Kvale, 2015, p. 112).

In this sense, the interviewer position and the design of the interview guide itself, is constructed with the aim of producing both doxa and episteme (Brinkmann & Kvale, 2015, p. 41). Where *doxa* refers to the informant's opinions and experiences – and is the type of interview data most often sought after in qualitative depth-interviews - *episteme* refers to interview data of a less subject-dependent nature and can ideally create an opening for public conversation in a way that doxastic data cannot (Brinkmann & Kvale, 2015, p. 43). As such, producing epistemic interview data, which is "justified discursively in a conversation" (Brinkmann & Kvale, 2015, p. 41) and across conversations with different informants, is the overarching goal of conducting the interviews in this set-up. The interview guide does, however, also contain questions of a more doxastic nature, in which I enquire about the informants' view of a given aspect of the Continental Shelf Project. As Brinkmann & Kvale note, it is not uncommon to interview for both types of data in the same research project (2015, p. 41).

The Interviewee:

Here Brinkmann & Kvale (2015, pp. 112–115) also identify a number of possible interviewee models: Reporter, teacher, or an informant/member. The latter is an interviewee model which is more ethnographic in character; it is often used with interviewees who are part of a particular setting, and therefore have knowledge of this setting. The *informant* can be seen as an expert on this setting and the interview often turns out to be more epistemic than doxastic. The interviewees in this research design are approached as *informants* precisely because they are experts on the focus of the investigation. As Brinkmann & Kvale note, this approach to the interviewees goes well with the goal of gathering interview data in the sense of episteme (2015, p. 113)

Bodies and non-humans:

The role of bodies and non-humans is not to be confused with the role of humans and non-humans in relation to the theoretical framework. When evaluating how bodies may affect the interview, the focus needs to be on body language and appearance as well as identity markers such as age, gender, race, class, ability etc. (Brinkmann & Kvale, 2015, pp. 115–116). On the latter point, I need to be aware that all the informants are my seniors – the majority of them by more than 30 years. Moreover, all of the informants are men and most of them are interviewed in senior positions. The power-asymmetry sometimes experienced in elite interviews could come into play and age and gender could add an extra layer to this. In order to minimize these effects a number of preparations were made.

Firstly, showing up well-prepared in the details of UNCLOS was important. While it would be impossible for me to 'read up' on geology and geophysics, it is indeed possible for me to know article 76, its interpretive

uncertainties and how it has been used in the claim. My aim has been to be able to ask detailed and critical questions about the use of UNCLOS in relation to the project, but also to show that I had 'done my homework' and to avoid being seen as someone wasting the informants' time. These strategies are also mentioned by Brinkmann & Kvale (2015, pp. 171–172) as useful for counter-weighing power-asymmetries in elite interviewing. Secondly, I also tried to think about my body language as well as my physical appearance. I always sat across from the informant with pen and paper ready as well as two Dictaphones and made sure to appear professional in my clothing, without showing up in the strictest business attire, which might also have created an awkward distance to the informants.

As for other non-humans of relevance, it should be mentioned that the interviews took place in the informants' institutions of employment; specifically in the informants' office, or in some cases a borrowed office or a canteen. As the informants allowed me to interrupt them during their working day, it was important to conduct the interview in the setting most convenient for them. The exception to this is IP7 who was interviewed at his private address. In all cases, interviews were conducted in an uninterrupted setting, providing the interview session with a good focus and flow of the interview itself.

Sampling and participants

The sampling strategy employed is what Silverman has called "theoretical sampling" (2013, p. 174). This is very similar to purposive sampling, but its entails a more direct link between the theory employed and the informants selected. Like purposive sampling, theoretical sampling works on the premise that the informants should be chosen by their relevance to the phenomenon or process being studied. However, unlike purposive sampling, the informants are not chosen as a representative sample from which generalizable statements pertaining to larger populations can later be made. Rather, the sample needs to be meaningful in relation to the theory used and the focus of the investigation.

The overall focus of this investigation is Denmark-Greenland's Continental Shelf Project, making it natural to approach the involved institutions. The participating institutions include the Geological Survey of Denmark and Greenland (GEUS), the Technical University of Denmark (DTU), the Ministry of Foreign Affairs of Denmark, Naalakkersuisut (the Government of Greenland) and the Royal Danish Administration of Navigation and Hydrography (Farvandsvæsnet), which has since been split up and subsumed under a number of different ministries. The selection of the specific informants bases itself on Strandsbjerg's (2010) theoretical approach. As mentioned, the theory suggests that scientific practice and those practicing science are the central informants. Selecting these has first of all been a matter of identifying project leaders and department heads, who have been involved with the data collection in the Arctic itself through the three LOMROG[22] expeditions and/or who have been part of the subsequent submission process to the CLCS. In other words, the informant selection has very much focused on gaining access to those people who have

[22] LOMROG stands for Lomonosov Ridge off Greenland. LOMROG I, II and III took place in 2007, 2009 and 2012, respectively.

worked most intensely with the Danish Continental Shelf Project – these were identified through various institutional websites and published materials about the project.

In addition to this comes another concern: Various scientific disciplines are involved in the project, thus interview data should represent a variety of different methodological lenses used in the data collection and processing. Finally, a concern with having enough informants to be able to create an overall understanding of the project and to enable validation of key statements has played a role. This led to the use of snowball sampling as the interview process went on, enabled by informants frequently pointing to further relevant informants. Overlaps with the initial informant-selection indicated that these had been the relevant people to contact. Overall, the sampling is focused on interviewing Continental Shelf Project participants from the different institutions and with insight of different parts of the process. The number of interviews conducted is also based on reaching the "point of saturation" (Brinkmann & Kvale, 2015, p. 140) at which further interviews would add little knew knowledge.

Initial contact to all informants was established via the e-mail in appendix 1. Here it was made clear that the informant would not be anonymous, unless they wished so. Some informants wanted a brief telephone conversation to get more context. No compensation was given for participation. Informants from all scientifically participating institutions have been interviewed. The Ministry of Higher Education and Science has not been approached as their role in the project has been purely practical. The Ministry of Foreign Affairs of Denmark did not wish to participate in an interview. They did, however, participate in a contextualizing conversation – this is not part of the interview data.

Table 1: Overview of interview persons

Name	**Informant number**	**Institution**	**Role in the Continental Shelf Project**	**Area of expertise**	**Transcription**
Niels Andersen	1	DTU Space	Consultant, involved throughout the project	Geodesy	Complete
Jens Jørgen Møller	2	GEUS	Senior consultant, head of GEUS' team	Geophysics	Complete after IP2's readthrough
Dennis Stanley Nies Anthony	3	Royal Danish Administration of Navigation and Hydrography (currently: Banedanmark)	Project coordinator on behalf of his institution	Geology/Physical Geography	Complete
Christian Marcussen	4	GEUS	Project coordinator/leader	Geophysics	Complete

			on the Greenlandic part of the project		
Flemming Getreuer Christiansen	5	GEUS	Deputy director	Geology	Complete
René Forsberg	6	DTU Space	Consultant, involved throughout the project	Geophysics & Geodesy	Complete
Jørgen Lilje-Jensen	7	The Ministry of Foreign Affairs of Denmark (Retired)	The Ministry of Foreign Affairs of Denmark's representative in the project up until 2014	(International) Law	No transcription, interviewer notes only
Rasmus Anker Pedersen	8	GEUS (currently The Danish Meteorological Institute)	Research assistant	Geophysics	Complete
Arne Døssing Andreasen	9	DTU Space	Consultant on magnetic and gravity data	Geology & Geophysics	Retraction of one paragraph, otherwise complete
Anonymous "Representative for Greenland"	10	Naalakkersuisut	Public employee with knowledge of the submission	Law	Complete

Ethical concerns

Unlike most interview-based studies, informants are consciously not anonymized, as is clear from table 2. An expert informant appearing openly adds weight and reliability to the data, and the non-anonymization of expert informants is thus not uncommon. Further, the names of the leaders of the Continental Shelf Project are already known to the public. Also, topics discussed are not of a personal or intimate nature, decreasing the vulnerability of the informants. Disclosure of the informants' full names has been agreed on with all but one individual who conceded disclosure on institutional basis. I have emphasized to all informants that I would respect any wish of anonymization, and I have made sure to obtain both verbal and written consent to public disclosure.

All informants were given the option to read through the completed transcripts to detract certain parts or the whole interview. Their choices are indicated in the 'Transcription' column of table 2. Moreover, informed consent has been ensured through a third party contract as required by the University of Copenhagen. Each informant has been sent an original version of this contract; the other original is archived safely.

The majority of the informants have agreed to appear with name and title, and I must take into account their professional standing. As noted by Brinkmann & Kvale (2015, p. 114), it is the task of the interviewer to make sure that the informants are not put in a vulnerable position, even though they may not seem to be vulnerable informants qua their participants as professional experts. My aim is not to expose any informant in any way, but rather to draw on their expertise and experience with the Continental Shelf Project. It is important that I keep this in mind when reporting the results, so that the interview data is reported accurately and interpretations that I make are fair to the original utterance by the informant.

Procedure

During the interviews I have sought to maintain control of the direction of the interview session, while also listening actively to be able to ask follow-up questions. Wengraf calls this "double attention" (2001, p. 194). I have aimed to let the informants speak freely and uninterrupted, but I have not refrained from asking critical follow-up questions to validate my own interpretations. Moreover, I have stuck to my interview guide in terms of questions asked, but the specific order of questions changed frequently. This is the strength of the semi-structured interview; it allows for a more naturally flowing conversation. All interviews lasted between 35 and 45 minutes, the majority of them just around 40 minutes.

Transcription style

The considerations regarding transcription style follow Brinkmann & Kvale's guiding question: "What is a useful transcription for my research purpose?" (2015, p. 213). All interviews were transcribed verbatim. The exact word use is not only important for understanding technical terms specific of UNCLOS or scientific terms, but also in regards to conveying perceptions of the different interview persons. As some of the questions are phrased rather openly, and others ask the informant to consider complex topics, silences and pauses arise. They are also transcribed, indicated by '…'. Emphasis on certain words is indicated with italics. Emotions, such as laughter or astonishment, are included – in square brackets – in order to ensure that things that were for instance said as jokes are also read as such. Repetitions are not included, even though these can also be telling of the thought process. By including many repetitions, the meaning of a sentence might be lost, and the technical experts may seem incoherent despite of commenting on a topic they are experts in, as Brinkmann has experienced (2015, p. 214). Informal paralinguistic are also excluded to facilitate a flow in the transcribed material, which often contains rather complex explanations.

Language

All interviews were conducted and transcribed in Danish. Direct quotes within the thesis text are, however, translated into English by the author with a view to obtaining the optimal balance between accuracy and meaning. Should there be translation errors, the mistake is mine only. The coded data, which is used in the analysis is visible from appendix 3, where each coded utterance is coded with line numbers and informant

number, so that the utterance can easily be found in its original language and context in the transcripts, visible in appendix 2.

Operationalization of the theory and coding strategy

Instrumentation and operationalization

Generally, research projects tend to proceed from theory/model building to theory/model testing, as Wengraf notes (2001, p. 51). This thesis belongs in the deductive camp, where a theory is understood as a model that may be a more or less precise depiction of reality. The aim here is to understand 'the particular' (i.e. the Continental Shelf Project) through 'the general' (i.e. Strandsbjerg's theoretical framework). Implicit to this aim is of course a need to discuss how well the general theory describes the particular project or case, and to discuss whether readjustments of the theoretical propositions are necessary. In this case, Strandsbjerg's theoretical framework makes certain statements about reality – what it is composed of and how it comes about – and so, in a sense, the aim here is to test the accuracy of a theory, which makes certain propositions about reality. This may sound like a meta argument running in a circle. Therefore, it is important to undertake a thorough operationalization of the theory, such that its claims about the creation of 'reality' may be tested in reality.

According to Wengraf, the first step in operationalizing a theory is to identify the key theoretical concepts (TCs) and to link these to what he calls "empirical indicators" (EIs) (2001, p. 53). This part of the operationalization is also sometimes called the instrumentation phase. EIs are observations or measurements that can be understood as evidence for or against a certain theoretical concept. This link can be tricky and depends increasingly on subjective arguments, the more complex the TC is (Wengraf, 2001, p. 54).

Having thoroughly laid out Strandsbjerg's theory already, it should now be possible to draw out its theoretical concepts.

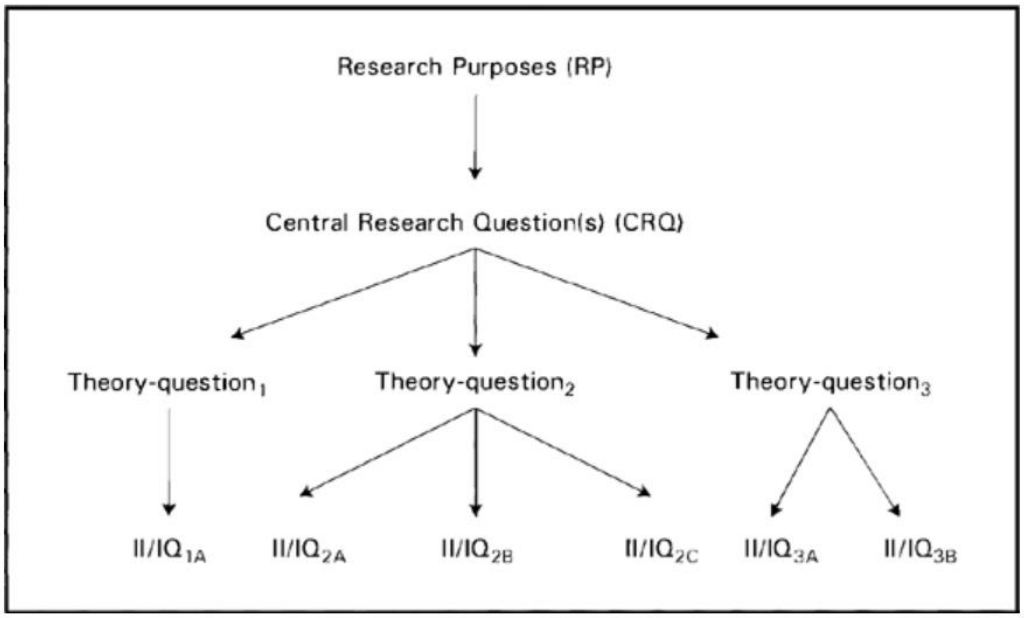
Table 2: Theoretical concepts (TCs) → Empirical indicators (EIs)

Theoretical concepts (TCs)	**Empirical indicators (EIs)**
Center of calculation	The existence of a shared system of meaning and knowing; (semi) Universal epistemic rules for meaning-making of data. (See footnote 9 for a discussion of the two types of centers).
Centre of accumulation	Physical existence of scientific expeditions, research hubs, coming-together of different disciplines; "the place where scientific

	knowledge production 'starts' and takes place" (Strandsbjerg, 2010, p. 99).
Chain of transformation takes place through stages of reduction	Increasing compatibility with the center of calculation through observation, recording/transcription, data processing and presentation.
Human agency in construction of cartographic space	Evidence of humans influencing cartography through decisions and interpretations.
Non-human agency in construction of cartographic space	Evidence of non-humans influencing cartography by existing in particular ways, unchangeable by humans.
A cartographic reality	The visual existence of map(s), which are assigned meaning and significance by decision-makers, policy-makers.
Cartography as a location-disconnected practice	The production of maps is possible without personal experience/physical presence at site.
Cartographic space	The existence of a geometrically abstract space produced through cartographic practice and existing through a map; the human and the nonhuman are 'folding' (Latour, 1999, p. 193) into a collective.
Cartography produces autonomous space	- The collective of human and non-human elements act in its own way, different from before they were this collective. - Action at a distance is possible via the map. - A geo-body exists irrespective of particular rulers. - Designation/naming of a certain geographical area, which can be encircled/pointed to on a map, and means the same for the majority of people. - Understanding what the space is (and is not), i.e. where it begins and ends, is possible through the map and without prior knowledge of its rulers, social composition, population.
The enabling effect of cartographic space	- The production of cartographic space precedes and enables the establishment of permanent, continuous territory. - The production of cartographic space precedes and enables the establishment of state sovereignty over that same space.
State space, i.e. territorial space	- The cartographic production of space is undertaken by or strongly endorsed by a state apparatus.
The cartographic reality of space	- Maps have been produced through modern cartographic practice and they exist visually and enable action at a distance. They assign political meaning (such as boundaries of sovereignty) and are seen as significant by decision-makers, policy-makers. - Cartographic space is key in deciding the reality on the ground such as being central to boundary drawing or territory division.

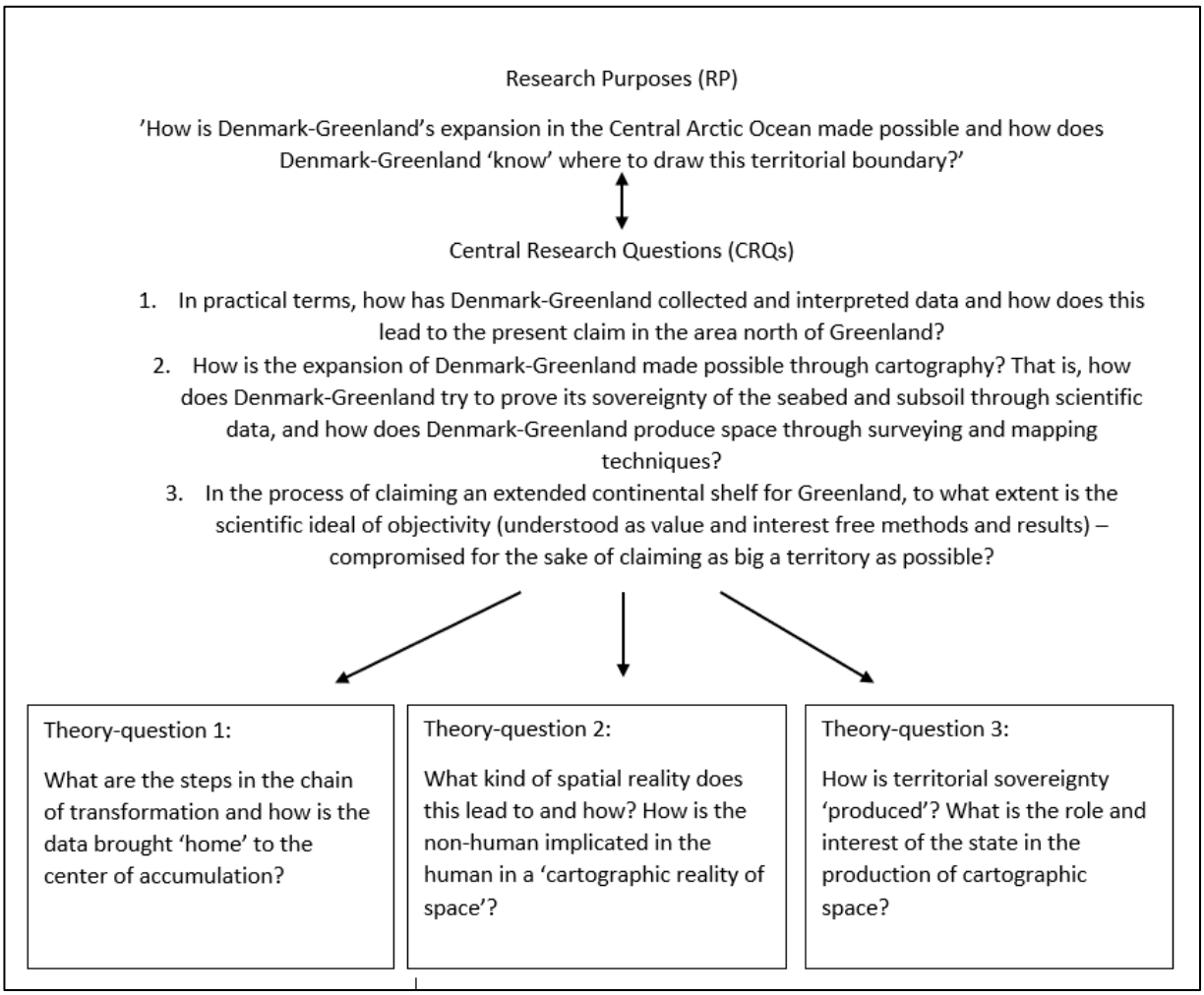
The next step in the operationalization is to distinguish theory questions (TQs) from interview questions (IQs). TQs should never be asked in an interview, but should be operationalized into IQs. Theory questions are based on the central propositions of the relevant theory and are "couched in the theory concepts of your research language" (Wengraf, 2001, p. 62). The interview questions, on the other hand, should be phrased in the language of the informants. IQs should be phrased in a way so that they may generate the desired data by linking directly or indirectly to the empirical indicators. Moreover, the TQs should direct the IQs (Wengraf, 2001, p. 62). Identifying the TQs is a process of linking the overall research purpose and specific research questions to theory questions. If the theory has been correctly identified as suitable in gaining answers to the research questions, this should be an unproblematic step. Wengraf suggests the following pyramid model (2001, p. 63).

Figure 6: From research purpose to theory questions (TQs)



Applied to this research design the figure looks like figure 7 on the next page.

Figure 7: Wengraf's pyramid model applied



Having identified the TQs, I would suggest that the logical way to link the process of TC→EI with the process of TQ→IQ is to let the empirical indicators inform the IQs and thus be the link between TQs and IQs.[23] If the theoretical concepts (TCs) identified in the instrumentation phase have been correctly identified, there should also be a natural connection between TQs and EIs. The operationalization leading to the IQs of the interview guide, is therefore a product of drawing interview questions from theory questions through the identified empirical indicators: TQ (and by extension TC)→EI→IQ. In addition, it is important that the IQs are phrased in the idiolect that matches the idiolect of the informants as much as possible. This has been a matter of understanding the correct terminology of UNCLOS and to some extent geology and geophysics, but also of phrasing the questions in a correct and precise Danish, but avoiding unnecessary formality, which could create distance rather than the much sought after 'rapport' with the interviewees.

[23] Wengraf also seems to suggest this but does not state it clearly. See Wengraf (2001, p. 62).

Table 3: Theory questions (TQs) → empirical indicators (EIs) → interview questions (IQs)

Theory questions (TQs)	**Empirical indicators (EIs)**	**Interview questions (IQs)**
Theory-question 1: What are the steps in the chain of transformation and how is the data brought 'home' to the centre of accumulation?	- Physical existence of scientific expeditions, research hubs, coming-together of different disciplines - The production of maps is possible without personal experience/physical presence at site - The existence of a geometrically abstract space produced through cartographic practice and existing through a map; the human and the nonhuman are 'folding' (Latour, 1999, p. 193) into a collective. - Increasing compatibility with the center of calculation through observation, recording/transcription, data processing and presentation	**IQ(1A): Can you tell me about your main role and tasks in the Continental Shelf Project and specifically in the submission north of Greenland?** **IQ(1B): What are you specialized in? Can you briefly summarize your field of expertise?** IQ(1C): What role does your field of expertise play in the Continental Shelf Project? IQ(1D): Can you tell me more specifically about your participation in the Continental Shelf Project? Including: - Participation in research expeditions - How you have undertaken measurements and where - What type of data you have taken with you onwards in the project - How you have analyzed the data and how it is part of the project - Whether you have helped in the formulation of material sent to CLCS
Theory-question 2: What kind of spatial reality does this lead to and how? How is the non-human implicated in the human in a 'cartographic reality of space'?	- The existence of a shared system of meaning and knowing; (semi)Universal epistemic rules for meaning-making of data. - Evidence of humans influencing cartography through decisions and interpretations. - Evidence of non-humans influencing cartography by existing in particular ways, unchangeable by humans. - The collective of human and non-human elements act in its own way, different from before they were this collective.	**IQ(2A): Based on your research results, what can be said about Greenland's continental shelf?** **IQ(2B): Has part of your task involved knowing the articles of UNCLOS, in particular article 76?** If yes, how have you gained insight into this? IQ(2C): Have you yourself read and interpreted UNCLOS, or have you received expert assistance from lawyers?

	- Designation/Naming of a certain geographical area, which can be encircled/pointed to on a map, and means the same for the majority of people. - Understanding what the space is (and is not), i.e. where it begins and ends, is possible through the map and without prior knowledge of its rulers, social composition, population.	IQ(2D): Have you looked at other coastal states' submissions relating to the Central Arctic Ocean or other coastal areas? **IQ(2E): Has UNCLOS' definition of 'submarine ridges' and 'submarine elevations' played a role in your research?** **IQ(2F): How do you know whether the Lomonosov ridge is a 'submarine ridge' or a 'submarine elevation'?** **IQ(2G): How do you understand the CLCS and accompanying sub-commissions – as a legal institution or as a scientific institution?** IQ(2H): Why does geology play such a big role in a legal document and is it a good way of making borders?
Theory-question 3: How is territorial sovereignty 'produced'? What is the role and interest of the state in the production of cartographic space?	- The visual existence of map(s), which are assigned meaning and significance by decision-makers, policy-makers - Action at a distance is possible via the map - A geo-body exists irrespective of particular rulers. - The production of cartographic space precedes and enables the establishment of permanent, continuous territory. - The production of cartographic space precedes and enables the establishment of state sovereignty over that same space - The cartographic production of space is undertaken by or strongly endorsed by a state apparatus. - Maps have been produced through modern	IQ(3A): Are your results directly implicated in designating how far into the Arctic Ocean Denmark-Greenland's sovereign rights stretch? IQ(3B): Who decides when to use the Hedberg Formula and when to use the Gardiner Formula? And how is this decided – based on what is possible or based on maximization of area? **IQ(3C): What is the main purpose of the Continental Shelf Project as you see it?** IQ(3D): Why are we mapping 'the Kingdom'? **IQ(3E): To what extent do you see the Continental Shelf Project as a geological-geophysical project, and to what extent as a political or juridical project?** IQ(3F): Were you surprised when you saw how big the claimed area is? If you were a Russian or a Canadian researcher, what would you say about the Danish-Greenlandic submission?

	cartographic practice and they exist visually and enable action at a distance. They assign political meaning (such as boundaries of sovereignty) and are seen as significant by decision-makers, policy-makers. - Cartographic space is key in deciding the reality on the ground such as being central to boundary drawing or territory division.	IQ(3G): Why don't we just make a partition deal with Russia and Canada and avoid the trouble of going through the CLCS-process? Why is the CLCS-recommendation so important? IQ(3H): If the Central Arctic Ocean had had the same 'common heritage of mankind' status as the Antarctic, would it then have been examined to the same extent as it has been? IQ(3I): What do you think will happen regarding the CLCS-recommendation and subsequent inter-state negotiations?

As Wengraf notes, the instrumentation process itself and its relation to TQs and IQs is not an exact science, and requires reflection during and after the analysis (2001, p. 62). One way to influence the quality of the gathered data is to think carefully about the structure of the interview guide. Of course, there are different degrees of semi-structuration. Here it has been important to maintain a flexible IQ sequence so that if an informant started talking about a topic originally planned for later, mostly this was addressed in the moment, and not 'paused' for later in the interview. Due to the complex nature of the IQs, it has been important not to create further complexity by breaking the flow of the interview. In addition, some questions were most relevant for the data analysts, while others were more relevant for project leaders and experts on UNCLOS. Therefore, not all questions were asked at all times. The interview guide was adapted to the situation, though some questions were always asked. These are marked in bold writing in table 3. The interview guide is visible from appendix 1.

Coding strategy: Manual, closed 'Concept coding' with an open category

In general, different types of coding will expose different aspects. Therefore, as pointed out by Saldaña (2016, pp. 74–76), it is necessary to reflect on issues such as research design (i.e. induction vs deduction) and the desired goal of the data collection. I have chosen to apply a manual coding strategy because of the necessity to extract complex meanings from the data, rather than analyze the language used, which electronic coding is often well-suited for. What I am looking for, are the empirical indicators (EIs), which are arguably quite abstract, and do not lend themselves easily to numerical or word-search types of coding.

I am curious to understand to what extent the interview data answers my research questions. However, since I have identified Strandsbjerg's framework as a suitable theory, I first need to understand how the collected data relates to the theory. In a sense, what I need to do, is to reverse the instrumentation and operationalization; in order to understand how the answers to my interview questions relate to my theory questions, I will need to look for the empirical indicators (EIs) of each theoretical concept (TC).

I first considered *descriptive coding*, which sorts the data into one-word topics (Saldaña, 2016, pp. 102–103). However, this coding would not help me say much about the theoretical concepts, which are more complex than 'one word objectives' such as 'a map', 'research', 'CLCS'. I therefore arrived at *concept coding* – also sometimes called *analytic coding* (Saldaña, 2016, p. 119). This is suitable where the aim is to "assign meso or macro levels of meaning to data" (Saldaña, 2016, p. 119). It focuses on the meaning or content of a statement, rather than its topic or its discursive structures. As Saldaña also notes, concept coding is particularly applicable in studies which aim to investigate sociopolitical constructs and to reflect on these. It is not about the particular choice of words from the individual participant, so much as it is about the reflection and recounting of what went on (2016, p. 120). As I discuss complex sociopolitical concepts this type of coding is deemed suitable.

The code book or coding categories are therefore the theoretical concepts (TCs) identified earlier. In the coding process, these were all given a colour, so that one transcript can be sorted into all the relevant theoretical concepts, springing from the empirical indicators identified in the transcripts. These different pieces of data can be a paragraph, a question-answer sequence or a single sentence. Once all transcripts have been coded the data is then lumped together according to its colour, i.e. according to the TC for which it is an EI. Visually the coding appears as a table per theory concept containing all relevant utterances (EIs) for that concept. While the 'clean' and uncoded transcripts can be taken from appendix 2, the coded and lumped data is available in appendix 3.

An open category will also be included in this closed coding. This is to allow unexpected data to speak. Some of this may be a previously unidentified empirical indicator, which relates to one of the already identified TCs, while another utterance might point to a new TC or in other ways be of a theory-developing nature.

Another thing to consider before starting the analysis is what Saldaña calls the "quantities of qualities" (2016, p. 25). As a general guideline, Saldaña (2016, p. 25) claims that an empirical indicator shared by approximately one-fourth of the participants warrants consideration in the analysis. While this will also be discussed when the validity of the study is discussed, it is worth mentioning here that this idea of an empirical indicator appearing a certain number of times is difficult to apply to the present study. This is because the theoretical framework is difficult to operationalize in precise terms, and because the informants have expertise in different fields. An informant might thus be the only informant with knowledge of a certain aspect. This is a consequence of interviewing experts from different fields. Statements only mentioned by one informant are therefore still included if they are deemed important and credible, which is a matter of evaluation from the analyst (Saldaña, 2016, p. 25). I have attempted as much as possible to back central statements up with utterances from multiple different informants so as to increase the validity.

As for the structure of the analysis and the discussion, the analytical section relates the TCs and their individual EIs back to the overall theory questions in order to understand how and to what extent the theory questions (TQs) can be answered with the data. This also includes an evaluation of how well Strandsbjerg's theory 'fits' the reality described by the informants. The following section discusses the answers to the research questions posed in the beginning of this investigation on the basis of the answers to the TQs. This discussion section also includes an attempt at triangulating the results and discusses the general validity of the results.

Analysis: Answering the theory questions and evaluating the applicability of Strandsbjerg's theory

Theory-question 1: What are the steps in the chain of transformation and how is the data brought 'home' to the centre of accumulation?

Identifying the centre of accumulation and understanding the chain of transformation

In trying to answer theory-question 1, 'What are the steps in the chain of transformation and how is the data brought 'home' to the centre of accumulation?', the first thing suggested by the data is that a **centre of accumulation** exists. It is not one place or one institution, but an amalgam of different Danish institutions which have been responsible for the planning and execution of the entire project. Dennis Anthony, IP3, notes that "it was a big project, which had one overall leader, and that was GEUS, who had the whole project". IP6, René Forsberg confirms this by calling the other research institutions "subcontractors to GEUS" and notes that the formulation of the material submitted to CLCS took place at GEUS, but with input from legal experts at the Ministry of Foreign Affairs of Denmark. The central role of GEUS is also confirmed by the fact that GEUS, and in particular Christian Marcussen (IP4), have been in charge of planning and leading the complex research expeditions to the Central Arctic Ocean. These have been carried out with a Swedish ice-breaker, a Russian nuclear ice-breaker, survey airplanes, helicopters and a vast amount of different scientific instruments.

The **centre of accumulation** has not been one physical place, but rather a coming together of many different kinds of experts in different geographical locations, including temporary ones like the LOMROG expeditions. To call the LOMROG expeditions part of the centre of accumulation is supported not only by their centrality in the process of data collection, but also by the fact that the initial data processing of some of the data, such as the bathymetric data, actually begins onboard. Dennis Anthony, for instance, remembers how the data processing of the bathymetric data was continuous and took place in shifts onboard the ship. It is therefore difficult to speak of one specific **centre of accumulation**, that the data is brought 'home' to and where knowledge production starts and takes place. What defines the centre of accumulation with its many sub-entities is its character as Danish-Greenlandic center. The role of the state is discussed below, when theory question three is analyzed.

The **chain of transformation**, carried out in data collection, processing, interpretation, and presentation, is central to the project. As noted by several of the informants, a submission has to be based on scientific data. Niels Andersen describes his understanding of science data as "physical…geodetic, geophysical, geological, bathymetric information…sedimentary things and all kinds of other things, which can be used in the argumentation for the submission. It has to be based on survey data." Specifically, a number of different scientific methods have been used in order to collect the necessary data. One of these is to emit sound signals for the collection of seismic data. Here a sound, which is sent towards the ocean bottom, can reveal layers of different materials in the subsoil. Dennis Anthony describes the equipment used as a particularly strong type of echo sounder. It is measured from a ship to which the sound returns and is captured by a hydrophone. Jens Jørgen Møller (IP2) explains this as the sound hitting a layer and then returning or reflecting the sound back upwards. However, as he also explains,

> some of it also continues further down, so that when you hit the next layer, something also comes back. So that you get sort of a mirror image of what is down there…but it is indirect, and

that means that you cannot see whether it is green granite, but you can see that it is something with some properties, which are different than the other ones.

This identification of different layers in the subsoil is important for understanding its composition and for identifying the thickness of sediments.

Bathymetry, i.e. depth measurements, have also been an important part of the project and have been used specifically in determining the foot of slope and thus the different constraint lines. Here, a single beam echo sounder is used to send down a sound signal directly below the ship, which is also reflected, thus measuring the distance to the seabed. A multibeam echo sounder was used to make more detailed profiles of specific sections of the shelf. This works in the same way as a single beam echo sounder, but can create complete 3D-images of a section of the seabed, rather than just single points of depth. As explained by Rasmus Anker Pedersen (IP8), with the single beam you only get "dots of information" and you will not know what exists in between these dots – with the multibeam you get an almost photo-like image of the area. But due to resources it is of course not possible to make a multibeam profile of the entire Lomonosov ridge. A challenge that arises when using this technique in the Arctic, is that the collected data, which is a product of sound signals, is polluted by the sound of the ice-breaker breaching the ice, and it is therefore necessary to clean the data of this disturbance through rather extensive data processing.

René Forsberg calls the seismic data "difficult to handle" and explains that a way to weigh up for this difficulty is to collect data on gravity and magnetism. Such data can reveal information about type of layers found in the seismic data; specifically, whether it is oceanic or non-oceanic crust. As Arne Døssing (IP9) explains, both the gravity and the magnetism of the geology underneath the ocean can reveal what kind of crust is being examined. These data are typically collected by plane and can be used to make what is called a "geophysical inversion". Arne Døssing explains that this is a way to "calculate backwards" from the data in order to decipher what kind of geological composition, including the thickness of sediments, fits best with the data. But just like the breaking of the ice disturbs the bathymetry data, so does the plane contaminate the data on gravity and magnetism, as the plane may undergo acceleration as the measurements are taken. Therefore, it is necessary to process also this data thoroughly in order to get the 'clear' picture.

Finally, a physical sample of the Lomonosov ridge has been collected. It is clear from the composition of this sample that it is not just a "transportation rock" which could have been moved by ice from the continent into the ocean, as Niels Andersen explains. This scrape is "in fact from the Lomonosov ridge, and it shows, that it is continental, i.e. an elevation" continues Andersen. Marcussen explains that the rock is important for demonstrating the continental nature of the Lomonosov ridge as the natural prolongation of Greenland. The latter especially as mountains of a similar age are known on Greenland's land territory. Lomrock, as it is named, now stands proudly in a glass cage in Christian Marcussen's office at GEUS.

Figure 8: Image of 'Lomrock' (photo by Thomas Funck, courtesy of Christian Marcussen)

From particularity to universality: Surveying a large area and bringing it to CLCS

In general, I am told that data is collected "in dots", "in lines" and "cross lines", and through "mowing the lawn", which is done by plane. The latter is to refer to a plane flying up and down an area in parallel lines, as done in the process of magnetism- and gravity data collection. These metaphors are telling of the **chain of transformation** which has taken place: a limited number of expeditions have had to survey and map a very large area of the Arctic Ocean. Unlike the data collected by plane, which is much cheaper to lease than an ice-breaker, the data collected by ship can only cover smaller, disconnected segments. Further to this, the ship cannot access all areas due to sea ice. Forsberg describes this data on gravity and magnetism, which is collected by airplane, as "coverage of a large plain", whereas the data collected by ship are "profiles". These different types of data, adds Forsberg, are then combined to get the full picture, but also to undertake a triangulation of sorts. The data on magnetism and gravity are mix of bathymetry and seismic data, so that when you hold it all together, it "mutually confirms each other", as Forsberg explains.

Hearing the informants speak about data collection and processing also reveals certain aspects of the cartographic process itself. The assertion that **geometric cartography is a location-disconnected** technique and enables an understanding of space despite lack of personal experience of it, is complicated by the data. It is so, that many of the geo-researches contributing to the project have not participated in any of the expeditions yet are able to contribute to the synthesizing of the data into a complete submission. These include: Arne Døssing, Niels Andersen, Jens Jørgen Møller, and Flemming Getreuer. But *someone* still had to physically go to the Arctic, sail up and down the Lomonosov ridge and fly over the coast of Greenland. This is

not necessarily a rejection of the location-disconnectedness theorized by Strandsbjerg, but it is a point worth noting, seeing that we live in a world where satellites can produce extremely accurate maps from space in no time. Because of UNCLOS' requirements of geological and geo-morphological data, sending researches to the Central Arctic Ocean has been inevitable.

The overall chain of transformation from amplification-particularity to reduction-universality is a combination of all these separate processes of reduction of seismic data, bathymetric data, magnetic data, and gravity data, respectively. A way to make sure that the chain of transformation was on the right track has been to examine the submissions of other states. Since the proceedings between each state and CLCS are not made public, there has been no publicly available sources of what is considered sufficient data and good data. Therefore, the scientists behind the submission have used the recommendations issued by the CLCS on other states' submissions to infer what kind of data is accepted for what kind of claim. Flemming Getreuer explains,

> Our people will relatively quickly be able to calculate backwards and say: Okay, if the outer limits of the claim [are there], then there must be a [unclear voice] data point there. If they have gone beyond 350 [nautical miles], then that means it has been accepted that this morphological complex has been accepted

Given the confidentiality of the CLCS procedure, this is the necessary way to gain information. It demonstrates the **reversibility** of the chain of transformation; it is possible for the experts to reverse the stages of reduction of another state's submission in order to get back to the particularity of each data point – at least to some extent. The reversibility of the chain of transformation supports the Latourian notion of how phenomena come about in general, but also helps us understand the specific ways that rocks, sediments, water and their various properties travel into the Continental Shelf Project to form an abstract space through the delineation line drawn around the Lomonosov ridge, as portrayed in figure 5. This is discussed in detail when TQ 2 is analyzed.

The very specific UNCLOS rules setting out how to construct a submission and maximize the area claimed, are explained to me by Christian Marcussen. He has a recipe for the procedure including which paragraphs of article 76 to use in what order and how to argue for the specific elements. By applying these paragraphs to the processed data, a map appears with a clear delineation line and an area inside this line, supposedly equaling the continental shelf of Greenland. What this shows is that the production of **cartographic space** in an UNCLOS-context is carried out in a particular way, which is a bit more complex than the mapping of a landmass, where the contours are easily identified by simple sight. Here the map is drawn almost in blindness – the scientists need to proceed slowly and probingly in order to figure out where and how the data they need can be found. In the Arctic Ocean where the terrain is difficult to pass through and where very little existing data can guide the project, that which is being measured and surveyed first needs to be identified, and thereafter collected as data through a number of different scientific techniques. The techniques differ from those that can be used on land. While geometric cartography is a part of the process, more indirect methods of collecting seismic, gravity and magnetic data are also used extensively. Because of UNCLOS, mapping and surveying as described by Strandsbjerg are not enough to produce the cartographic space. It must also be informed by more advanced techniques. But the data drawn out with these new techniques still come together through the chain of transformation to complete a map of the claim made; the **cartographic space** is thus finally produced.

Theory-question 2: What kind of spatial reality does this lead to and how? How is the non-human implicated in the human in a 'cartographic reality of space'?

A complex and unstable center of calculation

Before diving into the question of 'what kind of spatial reality this leads to and how' and by extension examining 'how the non-human is implicated in the human in a cartographic reality of space', a better understanding of the **center of calculation** is needed. This has already been touched upon, but a more thorough analysis of what it is and how it works is important, because the center of calculation is determining of the rules and meaning-making which direct how cartographic space is produced and functions.

In the theoretical section, the center of calculation was defined as *the more or less universal systems of knowing, epistemic rules and ways of giving meaning to something*. In a project where scientific data and international law have to tango, the obvious question becomes: Is the center of calculation the accepted rules of the (natural) scientific world? Or is it UNCLOS, which sets out the recipe for claiming an extended continental shelf in legal terms?

The informants of the science world – especially the leading figures – have clearly spent time reading, understanding and applying UNCLOS' articles 76 and 77, as well as getting to know how CLCS works. This shows the central role of UNCLOS and the CLCS. Niels Andersen makes a statement underlining this point, when he comments on CLCS by saying that it is a place

> where 21…more or less qualified people sit in order to evaluate (…) whether the way that you have treated your data is in accordance with the things that are set out in the Law of the Sea (…). That is how you should see the Commission. It is an advisory organ for the coastal state, but they are tough negotiations, you could say, or some tough things, you are put through because you are confronted with – in very particular ways – can you do that or can you not do that? Is it actually sufficient data, is there actually sufficient documentation etc.

Jens Jørgen Møller phrases it more directly, CLCS "has the final word" and he points out that it "looks a bit like what they do in a court room". This understanding is supported by lawyer and retired UNCLOS-expert, Jørgen Lilje-Jensen (IP7). He underlines that the decision made by CLCS is not a question of degree – a recommendation is either given or not given. This is the role of the law in the extension of a coastal state's continental shelf, as he says. The fact that a state can be sent away by the CLCS to gather more information – and the fact that this happened to Russia in 2001 – seems very present in the minds of the informants. I am reminded what happened in 2001 in almost every interview session.

While CLCS is clearly understood as a team of 21, which you want to comply with, the application of UNCLOS itself is to some extent an interpretive issue. This was touched upon in the section on UNCLOS, but it becomes even more apparent in the interviews. The uncertainty among the informants is clear, when I ask them what the difference between a submarine elevation and a submarine ridge is and how to document it. Not because they lack the expertise, but because article 76 is very vague in this regard. René Forsberg tells me that the elevation-ridge distinction is about two things: documenting natural prolongation and documenting the composition of the feature itself. But he also says that there is no clear answer to what the difference between a ridge and an elevation is – that he uses his "gut feeling" as a geophysicist and points out that there is "ambiguity in paragraph 76 itself". This ambiguity is why "Canada, Denmark and Russia all agree that it was

clearly and elevation[24], because all three of us were interested in going out along the [Lomonosov] ridge to get a piece of the Arctic Ocean."

The uncertainty of interpretation is not only an issue among the coastal states, but also seems to be an issue within CLCS. According to some informants, such as the representative for Greenland (IP10), CLCS seems to not always agree internally on how to apply key parts of UNCLOS. Christian Marcussen, who has first-hand experience with the Commission, also comments that many "entanglements" can occur when a sub-commission, set down to examine a specific claim, delivers its report to the main Commission. He also notes that "there is no agreement on the principles, how they can be interpreted in the Commission". Marcussen is backed up by other informants in his understanding of the Commission. Flemming Getreuer calls UNCLOS a "very atypical text" in the way that it is interpreted. He reminds me that the interpretation of the legal text is done by science experts, not by a judge with a law degree. Jørgen Lilje-Jensen agrees that there may be differing opinions within the CLCS, but he reminds me that dissent within the Commission plays no role in the final and binding decision of the Commission. The decision to give or not to give a recommendation is unanimous.

Though this is correct in theory, other informants add nuance to this assertion. Specific individuals with a certain interpretation of article 76 sometimes become dominant voices within CLCS. This can have a decisive effect on the decision made; Jens Jørgen Møller notes how "new people enter, and then they sort of change horse. I mean, they suddenly emphasize other things". Paring this statement, with the following observation from Christian Marcussen, I get the sense that the two GEUS employees are talking about the same individual,

> Especially in the previous submission, there was one person who had – according to us – not…differing opinions than those held by us…'us' I say…that our submission was built on, anyhow. So it wasn't…he is not there anymore, but there are still some individuals, who follow his ideas. He had a sort of followers, so there are some, who followed him.

Both of these statements are echoed by Flemming Getreuer, who has noticed not only a difference in the level of competency among the members of the CLCS, but also that some members are "very strong – both professionally, but also strong personalities with strong opinions". In this way, it seems that certain paradigms and personalities can develop within the Commission, and thus affect the whole process.

It is clear that UNCLOS, and by extension CLCS, makes up a **center of calculation** that the coastal state has to comply with. The data collected must be made sense of through the rules set out in the Law of the Sea, and according to what can be documented in front of the CLCS. The epistemic rules for how to draw your delineation line are set out by UNCLOS and the Commission in combination. However, the commonly-used requirements of scientific data, accepted in the (natural) scientific world, are also relevant to the Continental Shelf Project. Arne Døssing, for instance, has interpreted and formulated his data on the basis of his scientific background, and with the aim of publishing academic articles. These articles have passed through the hands of three anonymous reviewers and have been published in academic journals. Arne Døssing adds that these

[24] Forsberg actually uses the word 'ryg' (ridge) here, but I am quite sure he means elevation, as that is what gets you "a piece of the Arctic Ocean".

published articles can also be drawn into the CLCS-process and in this way add further weight to the documentation of the claim. As such, it is important to remember the centrality of the data in all of these questions of legal interpretation. As Døssing says,

> It is what it all depends on. You can be excellent in using the legal framework and all kinds of other things, but if it is the case that the data is not there, well then it is simply just not there. So I think…well, a lot of emphasis was put on the data showing what it was meant to.

The meticulous and costly data gathering in the Central Arctic Ocean also illustrates the importance of scientific standards as a part of the center of calculation. As shown here, the center of calculation is not a straightforward concept to apply to the Continental Shelf Project. It is not just one set of rules with one type of internally consistent logic. Rather it is a complex mix of scientific standards stemming from the world of natural science, and of legal terms agreed on by the UN member states. As we shall see, the scientific standards are sometimes squeezed in order to fit UNCLOS demands, while UNCLOS itself is often quite vague regarding what kind of data will fulfill its terms. This cocktail makes it a complex and unstable **center of calculation**, where the correct way to document something is not always clear, and where the epistemic rules are sometimes applied in an unpredictable way.

The collective of the human and the non-human

By now it has hopefully become clear how the **chain of transformation** and the **center of calculation** are both products of an interplay between science and law. But acknowledging this says very little about the role of the **non-human** in the final product of this whole process: The claim to a vast area in the Arctic Ocean, encircled by the delineation line. As discussed above, human agency is inevitable in the whole process. Not just because UNCLOS is a human construction, and because CLCS consists of 21 humans, and because the scientists gathering data are humans. But also because human reasoning and interpretation are very central parts of the process – both at the stage of data processing and in the Committee itself as described. But how is the **non-human** implicated in all of this, and does it fold with the **human** in certain ways to lead to the kind of cartographic reality of space theorized by Strandsbjerg? Some ways have been hinted at already, but a few of the non-human elements deserve a proper inclusion, as they have very fundamental impacts on the whole project.

A very obvious way that the non-human, defined as *something that exists in particular ways, unchangeable by humans*, influences the entire data collection is through the sea ice in the Arctic Ocean. As already noted, the ice made it impossible even for the Russian nuclear ice-breaker to reach certain areas where data was needed. Christian Marcussen could have used more data to support the claim that the Lomonosov ridge is a natural prolongation of the Greenlandic shelf, but because the Arctic Ocean "was and still is difficult to pass through, it is not the case that we have a surplus of data" – though he does believe that they have submitted enough to document it satisfactorily. The ice has been a factor from the planning phase. René Forsberg tells me that the initial plan was to collect data from "ice camps". This plan was, however abandoned because the project was given the opportunity to lease the ice-breakers, but also because "the climate changed and ice camps became more and more unsafe", as Forsberg explains. So the ice was a hinderance for the data collection in at least two different way; by being too thick and, paradoxically, also by being too thin to camp on.

On a very general level, the difficulty of navigating the Arctic, caused by the ice, has impacted the mapping of the area for hundreds of years. Rasmus Anker Pedersen knows this as a climate researcher with expertise on the Arctic: "The Arctic is so difficult to access that it is really badly mapped". This is also what oil-interested companies realize one after the other, as he explains to me. They end up giving up their searches north of Greenland because the ice is too big a challenge. The ice is a real factor that has to be dealt with when navigating in Arctic waters. Rasmus Anker Pedersen goes as far as to attribute some role to the ice in keeping the Arctic peaceful thus far – as he says, it is simply too difficult to navigate.

Also worthy of mention as **non-human** factors affecting the claim are elements like sediment thickness and transported materials. The sediment thickness influences how far out you can draw your delineation line, because as mentioned earlier, the use of the Gardiner formula depends on this. If the sediments are not thick enough relative to the distance, the Gardiner formula cannot be used for delineation. As Niels Andersen confirms, it "depends exclusively on what…how *reality* looks. Is there enough sediment thickness and so on. Whether you can use one or the other." This statement is quite clear on what the deciding factor is; not data collection or interpretation, but the lay of the land – literally understood.

Probably the most important **non-human** factor, which has affected the submission is, not surprisingly, the earth's crust, i.e. the geological composition of the Arctic Ocean. This is central to UNCLOS' distinction between submarine ridges and submarine elevations. Whether these are of oceanic or continental crust has "far-reaching influence on how far out you can go", as Niels Andersen tells. A more detailed explanation for how to tell the difference between oceanic and continental crust comes from Arne Døssing, who has analyzed the relevant data. His explanation is worth quoting in full, as he explains it much better than I could.

> L: Yes. And where…perhaps it's a big question to pose, seeing that I'm not a geophysicist, but…how pronounced is the difference between continental crust and oceanic?
>
> IP9: Eh…in magnetic data in a classical geological area, you could say…let's say that we take…we start in Norway and then we travel out into the North Atlantic. There is a very clear difference, when you reach an oceanic area. What is specific to magnetic data, when you are in an oceanic area, is that you can actually have sort of stripes in your data. So you have…which come from when the earth's magnetic field flips every now and then – it flips approximately every 700.000th year, the earth's magnetic field, then it flips completely 180 degrees, and that actually causes the crusts that you get in oceans to be magnetized in the opposite direction.

The stripes that come from the reversal of the magnetic field are only visible in oceanic crust. Continental crusts never have these stripes because they have been formed in very different ways through mountain formation or volcanic eruptions for instance, as Døssing explains. In relation to the submission, Døssing says that the Amundsen basin, which lies east of the Lomonosov ridge, contains clear stripes, even though the dividing line between that and the crust of the Lomonosov is not as clear as it could be - but "it's quite pronounced still". In that regard, it seems that the Continental Shelf Project has been fortunate that the geology of the claim speaks relatively clearly about its formation history.

The formation history of Greenland's continental shelf is a central part of why the claimed area is so big. It is summed up by Christian Marcussen; 470 million years ago Greenland and Russia were part of the same continent. They started drifting apart and in-between them, the Central Arctic Ocean appeared – this is at least so for the area around the Lomonosov ridge, adds Marcussen. The Lomonosov ridge itself is "a piece of continent, which has drifted away from Siberia together with Greenland", explains Marcussen. This distinct

formation history of the Lomonosov ridge is the very foundation for the claim to the vast area north of Greenland. Marcussen is optimistic about CLCS agreeing with him,

> Regarding the Lomonosov ridge, I believe, the sub-commission cannot say much against the arguments which are coming from everywhere; that it is a continental ridge which is geologically connected…so it should be able to pass all of that…that classification that it must be a submarine elevation, instead of a submarine high. So. Submarine ridge, sorry.

There is only one statement in all of the interviews which challenges this view of the formation history of the Greenlandic shelf. When I ask Arne Døssing the open question, 'Based on what you have participated in, what can be said about the Greenlandic continental shelf?', he gives an interesting reply,

> IP9: Eh…[he laughs and thinks for quite a while]. It is very complex. And…probably also more complex than many would have liked it was.

I ask him to elaborate, and he tells me that they had found some

> evidences in the data, which could indicate that there was an issue regarding going from Denmark – or going from Greenland, so to speak – and out onto the Lomonosov ridge. So this prolongation, you wanted.

The "issue" was that some data indicated that Greenland had not been connected to the Lomonosov ridge until 40 million years ago. And as Arne Døssing kindly reminds me, 40 million years is nothing in geological terms. The seismic sound wave, sent down through layers of geological material, should preferably not be significantly different between one place of measurement and the next, if one wants to prove a geological continuity. As Døssing explains, the wave came back quite differently at different points in the area where the Lomonosov joins Greenland. The discontinuity indicated a "dramatic change in the geology" north of Greenland. This was the first time that the project encountered the discontinuity, according to Døssing, and it led to extensive discussion, because as he says, it was "worrying" and it "could jeopardize everything". But Døssing's suggestion for how to deal with and interpret this "jump" in the geology also ended up being the solution.[25] He suggested that the important thing in terms of the natural prolongation criterion was to show that Greenland and the Lomonosov ridge moved as one unit today and had done so for millions of years. It is still possible to see a border between the two, but it is not an active border – there are no earthquakes or other signs that the two sections move independently of each other, as Døssing explains.

This situation, which sounds like the closest the project came to a crisis, is very telling of how the human and the non-human are implicated in each other in the creation of a certain spatial reality. The geology is difficult

[25] It is difficult to verify this assertion, because the submission is confidential except for its Executive Summary. The Executive Summary seems to say this also, but my knowledge of geological ages and their names do not suffice to make any judgment on this. The summary says the following, "Since the end of the Eurekan Orogeny, the Lomonosov ridge has been firmly attached to the Lincoln Shelf and Northern Continental Shelf of Greenland and has been drifting with the North American Plate" (See Denmark & Greenland, 2014, p. 12).

to access due to the surrounding environment and when it finally starts revealing itself, it is not in a way that suits the overall argument of the project. In fact, it shows a geological border in a place where the scientists do not want any kind of political border to be drawn. The solution is to look at the geology from another angle, while also going back to the legal framework to search for alternative interpretations. The inconvenient picture, presented by the non-human, cannot simply be ignored or forgotten about. But it can be presented in a new light, with new reasoning. This is the folding of the human and the non-human into a new kind of phenomena, where the Lomonosov ridge and the humans studying it are working as a collective to prove that it belongs to Denmark-Greenland; cartographic space, **the circulating referent**, comes about by circulating between humans and non-humans through the stages of reduction to come about as a phenomenon of its own; as **autonomous space** in the shape of a claim, which can be referred to and pointed to on a map – but which is not necessarily accepted by the majority of people, as is now discussed.

Ambiguous non-humans and contingent autonomous space

So far Strandsbjerg's framework has facilitated an understanding of the complexity of the Continental Shelf Project; how humans and non-humans act as a collective, the role of the centre of accumulation in this and how the center of calculation is a more diffuse and complex size than in most research projects. However, when it comes to the notion that **cartography produces autonomous space**, some modifications are necessary.

I am reminded by Jens Jørgen Møller, René Forsberg and Niels Andersen, that the CLCS-process is only one step of two. As Møller explains,

> CLCS can easily say: Jep, that's fine. Denmark-Greenland they can have it all…everything north of Greenland. And then they can say the same to the Russians, and they can say the same to the Canadians

If so, the problem emerges that the overlapping states need to divide it between them, as Jens Jørgen Møller continues. These very distinct and separated steps of the process cannot be directly compared to the cartographic process as described by Strandsbjerg. Autonomous space is established by the project through a cartographic process, but it is not a space which is commonly accepted – it is not the same autonomous space for the majority of people. If we are asked to point to 'the Kingdom of Denmark's' part of the Arctic Ocean, we might point to different place on the map, depending on our point of view. Referring to it, will not mean the same in Russia as it will in Greenland because the autonomous spaces overlap. To this, Strandsbjerg might counter that it is because the space has yet to be divided, and this division is exactly what the geometric map enables. But there is a fundamental difference here. The overlapping spaces have not necessarily come about through the same quality of data, the same type of measurements, the same interpretations or the same uses of article 76 – unlike the maps analyzed by Strandsbjerg, which are the products of the same data collection methods and interpretation. This variety in the cartographic production of autonomous space is caused by the instability of UNCLOS/CLCS as a center of calculation, and by the non-humans obstructing the data gathering.

Moreover, it is not the shape of the land sticking above water, which determines how the space is calculated, but the seabed and subsoil. And this adds further complications. Unlike land, oceans are difficult to gather data on and in, and delineations (and subsequently, delimitations) will be made by letting geology and

geomorphology speak. The mapping process of UNCLOS allows for a much more complex non-human to speak with all of its ambiguities than is the case in the mapping and division of land. That geology and geomorphology can play an ambiguous role is evident from a number of the informants telling me that until CLCS has issued a recommendation to Denmark-Greenland and to Russia, we are all "in the same boat", as Jens Jørgen Møller calls it. Denmark-Greenland's and Russia's argumentation are based on the same geological formation history, namely that the Lomonosov ridge is a submarine elevation. This is also why Russia has been relatively open in sharing its data with Denmark-Greenland, as René Forsberg explains. If Russia's submission is rejected, most likely will Denmark-Greenland's also be.

In this way, it seems that autonomous cartographic spaces can not only overlap, but also be dependent on the other's existence to ever turn into a sovereign territory. This does not necessarily take away its autonomy – it can still be known on its own through a map – but its eventual metamorphosis into sovereign territory is contingent on a submerged physical feature, the Lomonosov ridge, and its international acceptance as part of that state. This mechanism echoes the groundedness of the medieval kind of sovereignty, which depended not on submerged physical features, but on castles and lords positioned in certain locations. Thus, the spatial reality of the claim might be autonomous because it can be known on its own, irrespective of particular rulers, but it cannot be compared directly to the cartographic space produced through the mapping of land, because it does not mean the same for everyone – its autonomy is contingent on who is referring to it.

Theory-question 3: How is territorial sovereignty 'produced'? What is the role and interest of the state in the production of cartographic space?

Indisputably a state project

That the role and interest from states regarding the Arctic Ocean has been minimal until very recently is clear from the poor quality of data and maps that existed before the mapping of the continental shelf began. As René Forsberg notes, before the project began "everything north of Greenland was a kind of a white spot". No one ever came up there". The dire need for more data on the Central Arctic Ocean is also evident in the approach on the expeditions. Rasmus Anker Pedersen remembers that the data collection started the minute the expedition sailed from Longyearbyen on Svalbard; "Immediately we started mapping because it is so unknown, so all data is valuable". What this shows, is the importance of maps, the existence of a **cartographic reality** in general, evident in the real and pertinent need for mapping the coast of Greenland and the Arctic Ocean.

The fact that the area has been so poorly mapped, is probably due to the state's historical interest in land, rather than water and ocean seabed, as Anker Pedersen reflects. This is, however, changing with the development of new technologies, which can utilize resources on the seabed and below it. This is also in line with Jørgen Lilje-Jensen's explanation of why a third version of UNCLOS was formulated – the concept of an extended continental shelf developed hand in hand with technological developments. Suddenly states became interested in mapping this area, which might indicate that the **cartographic reality of space** is closely tied to new economic incentives materializing and strategic advantages gaining importance.

That the cartographic space which is produced through the Continental Shelf Project is a product initiated and carried out by a state, in the attempt to create **state space – i.e. territorial space** – comes as no surprise. The role of the Danish-Greenlandic state apparatus is indisputable. The project is approved by the Danish

parliament, financed on the state budget, carried out by two ministries and a research institution (GEUS) which is tied to a third ministry, and also approved by the Greenlandic government. Moreover, UNCLOS is a UN convention ratified by states and with the coastal state as the subject holding the right to lay claim to its continental shelf. As such, there should be no doubt that this is a state project.

Maximization of the claim for the sake of national interest and sovereign rights

In general, informants, such as Niels Andersen and Dennis Anthony, speak of the "opportunities" presented by UNCLOS. Christian Marcussen seems to agree and says that the "mission statement" for the project has been to "maximize the area that you lay claim to". In general, I hear the word "maximize" from the informants without introducing it into the conversation myself. Flemming Getreuer says that for all countries it is about "maximizing your claim", and that the Continental Shelf Project was tasked with "maximizing to the extent it was possible for us, with the data we have". René Forsberg sees it as a way to determine "this is my lawn" and then the search for resources will come later. And Arne Døssing joins the choir; "it was quite simply about maximizing this area. Because – I got the sense of this – the more we maximized the area, the more we also had to give. In the negotiation." This strategy of maximizing in order to have a stronger negotiation position later, when the delimitation process begins, is also mentioned by Flemming Getreuer, who adds that "you know that you will not get all of it (…), but first things first, it is about just getting an acceptance that you have a legitimate claim."

If the name of the overall strategy was 'maximization', then the raison d'etre is the state's survival through the safeguarding of its national interest – at least according to the informants. The representative of Greenland says that maximization is in the interest of the country, and Jens Jørgen Møller agrees with this and adds that "that is just something you do" as a state, while Christian Marcussen, specifically says "it is actually to follow a nation's interest". Niels Andersen goes even further and thinks that,

> as a state you…sort of say: Well, that we have to do [make a submission]…not just for the sake of sovereignty, but I mean you want to secure the future of the state, you could say. So in some way I think that you are obligated to do so – use the opportunities you are given.

These statements of course correspond well with the most important mechanism of Strandsbjerg's theory; that the production of cartographic space **precedes and enables** the establishment of permanent, continuous territory and the establishment of state sovereignty over that same space. These statements all seem to suggest that the underlying reason for the existence of the Continental Shelf Project is to make territory claimable through UNCLOS, so that it may become national territory over which the state has sovereign *rights*.

There are, however, a few modifications to this seemingly very well-fitting theoretical concept. First of all, the fact that overlapping states can make a delimitation agreement before their submission has even been presented to the CLCS is a moderation of the importance of cartography in this whole process. If the CLCS recommendation is by-passed in this way, its role ends up being a simple stamp of approval, rather than a potential tool in the delimitation process. The CLCS is then reduced to a group of scientists agreeing that some geological argumentation for the claim exists, but its recommendation will have no effect on the **reality**

on the ground because that has already been decided through the prior delimitation agreement. A division has been agreed on before any maps, based on the geology and geo-morphology of the area, have been examined or approved. This is not to disapprove of the idea of an early delimitation agreement. It is to point out that perhaps Strandsbjerg's theory needs a separate chapter on cartographic *oceanic* space and how to claim such a space as territory in the 21st century.

Second, when a delimitation has been agreed on – whether it is with the recommendation of CLCS in mind or through a prior delimitation agreement – what the state has achieved through its 'new' territory is not *sovereignty*, but sovereign *rights*. In Strandsbjerg's theory the sovereignty that can be tied to territory is a comprehensive form of sovereignty, as evident from his case study of Denmark proper. When a state's territory is expanded through article 76, it only provides the state with sovereign rights to the seabed and subsoil. It does not give any sovereign rights regarding the water column or airspace. As such, the sovereignty that is awarded the state through its new territory of the continental shelf is a bounded kind of sovereignty. Perhaps it is unfair to critique Strandsbjerg for this aspect, because his case study is a historical one, which refers to a perioed long before UNCLOS. However, Strandsbjerg does mention UNCLOS in his conclusion, and seems to suggest his theory's ability to also account for this contemporary regime (See Jeppe Strandsbjerg, 2010, p. 153). I would argue that the fit is good, but not perfect, and some of the differences are quite important in terms of cartography's role and the type of sovereignty that can be claimed.

The open coding category

Many utterances from the informants have been placed in the open category. This is not surprising, seeing that the interviews are relatively long and contain lots of information which can be more or less relevant to the theory questions. While a lot of this data is interesting and at times surprising, it has not provided insights so relevant to the theory questions or research questions that it is included here. That the open category does not add results that are of central importance to the overall research purpose is perhaps not surprising, seeing the large number of coding categories already involved in the data analysis. The result of the open coding is, nevertheless, included in appendix 3.

Discussion and triangulation

It is hopefully clear from the previous section where the theory accounts well for the Continental Shelf Project, and where the 'reality' coined by the theory diverges from the reality described by the informants. With that in mind, this section aims to discuss how, and how well, the analytical section answers the three research questions (CRQs) and the overall research purpose (RP). After discussing the answers to the RP and the CRQs, an attempt to undertake a triangulation in order to verify the results is made, and finally the validity of the results is discussed.

Research question 1: Firstly, in practical terms, how has Denmark-Greenland collected and interpreted data and how does this lead to the present claim in the area north of Greenland?

The response to TQ1 in the analytical section answers this first research question well. Therefore, a summary of the previous answer is presented at this point. Denmark-Greenland has collected data through a number of scientific methods and the data collection has primarily taken place through the three LOMROG expeditions. The data processing and interpretation took place primarily in Copenhagen, after which the material was submitted to the CLCS. The CLCS has yet to issue a recommendation (or a rejection) of the claim. The present claim has materialized through the application of scientific standards and the paragraphs of UNCLOS' article 76 to the collected data. As such, the area that has been claimed by Denmark-Greenland is a result of examining the geology and geomorphology of the Arctic Ocean and the interpretation of this through UNCLOS. This has resulted in a large claim, based on the main argument that the Lomonosov ridge constitutes a natural prolongation of the Greenland Continental Shelf and that it is a submarine elevation, not a submarine ridge. In this way, the claim is a result of the coming together of the geology and geo-morphology of the area and the human interpretation of these physical elements through a mixed science-UNCLOS lens. This is how human elements have blended with non-human elements to form a claim, a cartographic space, which has materialized through a scientific process, in which the particular is cleansed of its particularity in order to assume a more generalizable character, thus becoming a certain type of recognizable spatial phenomenon.

Research question 2: Secondly, how is the expansion of Denmark-Greenland made possible through cartography? That is, how does Denmark-Greenland try to prove its sovereignty of the seabed and subsoil through scientific data, and how does Denmark-Greenland produce space through surveying and mapping techniques?

The expansion of Denmark-Greenland is made possible through its ratification of UNCLOS, and cartography is an inevitable part of this process. The collection and interpretation of data and the drawing of this data onto a map is an inevitable part of claiming a state's extended continental shelf, and it precedes and enables the establishments of sovereign rights to the continental shelf. The cartographic part of the process must be based on data – also if the state has made a prior delimitation agreement. It is, however, a very specific type of cartography that makes that expansion of Denmark-Greenland possible. The features from which the data is extracted are what give the claim its shape, however, they are not necessarily visible on the map in the same way as landmass is on a traditional land map. So while cartographic techniques are unavoidable in the effort to expand Denmark-Greenland, understanding the role of cartography in this expansion requires knowledge of not just modern techniques of land measurement, but also an understanding of the geology and geo-morphology of the area, the methods used for collecting this data and how to interpret this data in accordance with UNCLOS.

The process of proving this expansion requires the more or less cooperative assistance from 'nature'. The geological formation history, its main features and layers, must be made to speak somehow, so that its character can be determined. But in some ways this character takes much more effort and requires much bigger interpretive leaps to be revealed than that of land. The climatic circumstances of the Arctic add an extra challenge to the effort of understanding the geology and geo-morphology of the area. But scientific data must be collected in order to prove the validity of the claim and to lend itself to interpretations which

maximize the cartographic space. The data is collected with the sole purpose of making the area claimable and later divisible in the delimitation process.

Further, while space is produced through surveying and mapping techniques, it is not only produced through direct techniques. Unlike landmass, standard cartographic techniques of distance and depth measurements must be combined with more indirect geophysical techniques to form an UNCLOS-compliant claim. The space produced is not determined by the shape of visible features, but rather drawn out from invisible features and compositions, which are then fitted into a formally rigid, but interpretively vague legal framework. The vision behind UNCLOS of 1982 is probably to let the geological and geo-morphological features speak loud and clear about where borders should be drawn. Its intention is good as it attempts to designate what 'naturally' belongs to the state, but it is important to remember that a submission is, by its very nature, a state project and this makes it a particular kind of mapping project, as is discussed now.

Research question 3: Thirdly, in the process of claiming an extended continental shelf for Greenland, to what extent is the scientific ideal of objectivity (understood as value and interest free methods and results) – compromised for the sake of claiming as big a territory as possible?

The analytical section revealed that the headline of the Continental Shelf Project has been to maximize the claim. This has been the wish of Denmark-Greenland, and as such the project is indisputably state-led and driven by the interests of the state. It would not be fair to say that the scientific data does not comply with scientific standards – the methods used have been the accepted methods used in the various disciplines, and they have been employed by scientist with professional reputations to uphold. But the sites for data collection and the type of data collected are directed only by what would benefit the credibility of the claim and/or maximize it, not by what would benefit science in general. An appropriate comparison made by two of the informants, Dennis Anthony and Christian Marcussen, is that of a consultancy project. According to Anthony the project could have been undertaken by a private consulting company, were it not for the cost of such an outsourcing.

A relevant question here is to what extent the project is 'science' or 'scientific'. When I asked the informants whether they considered the project to be scientific, legal or political in nature, I got vastly different replies. In their replies, the informants identified elements of all three, but one evidently has prevalence over the other two: Politics. The role of the law is ever-present at all stages of the project through UNCLOS and CLCS. But even though some see it as a limited consulting task, the majority of the informants still emphasize the huge scientific value of the project. As René Forsberg says, "you got some data in an area where you had never had any data before, so from a purely scientific point of view, it was super interesting". As such there is still 'science' to the project, and this also confirms that the data collection lives up to scientific standards.

However, while the methods for collecting data might be value and interest free, the sites chosen for data collection and the subsequent interpretation of the data are not so easily categorized as objective. The data collection and treatment have been carried out with the aim of using the formation history to secure the maximum claim. This is evident in the minor crisis that seems to have ensued after Arne Døssing found some evidences, which did not fit the overarching argument of the claim. In a normal research project, these data would maybe have confirmed or refuted a hypothesis, and therefore be more or less interesting to the researcher, but they would not have been viewed as problematic. In the case of the Continental Shelf Project,

the data was not to be used for hypothesis testing. On the contrary, each data point constituted a small piece of empirical support for a very particular argument.

The idea and aim of UNCLOS of 1982 is probably to ensure and facilitate the fair and peaceful making of borders at sea. Seeing how borders and border-making have been a contentious issue throughout history, this is an honorable intention. But the relationship between law, science and, the interest of the state is not a straightforward or unproblematic one. Regarding the Continental Shelf Project, it is quite clear that science has been the assistant of the state; it has been employed in order to secure the most favorable outcome. The role of science has not been to enlighten humankind through new discoveries. Therefore, it is important to realize what UNCLOS makes of science, and how science is used politically by the state in the bid for a continental shelf beyond 200 nm.

Epistemologically we are left with valuable scientific results that give new insights into an unexplored part of the world. But their practical application through UNCLOS should be seen for what it is; a cartographic reality of space which is 'real' or 'true' so long as what one is asking pertains to the claiming of a continental shelf. The claim is an answer to a set of very specific questions posed in UNCLOS and through the CLCS. As such, the claim is a cartographic reality of space that has come about through a specific folding of the human and the non-human in which the human has put a distinct mark on this specific reality. Other realities exist simultaneously – the non-human, in the form of geological features, continues to exist in its own way, irrespective of the way CLCS categorizes it. Moreover, another reality, where the human and the non-human are also folding, but in which the non-human speaks through fewer layers of human interpretation, also exists. It is, however, not the reality presented by the Continental Shelf Project.

<u>Research purpose: 'How is Denmark-Greenland's expansion in the Central Arctic Ocean made possible and how does Denmark-Greenland 'know' where to draw this territorial boundary?'</u>

Concluding on the research purpose, it should be clear that Denmark-Greenland's expansion in the Central Arctic Ocean is formally made possible through compliance with UNCLOS. The size of the proposed expansion, running all the way across the Central Arctic Ocean, would not have been possible without a geological formation history potentially allowing for the drawing of a delineation line far beyond the standard constraint lines of article 76. The expansion is at the mercy of elements uncontrollable and unchangeable by humans. The geological features of the Central Arctic Ocean have thus allowed for a maximization of the claim, but the argumentation underlying the maximized claim is of a decidedly human and political kind.

The fact that these submerged geological features are not easily 'known' means that their delineation also becomes a matter of applying formula lines, which are arbitrary by nature. They are mathematical formulas and distances suited to fit the standard case – but there is no such thing as a standard case when it comes to the earth's geology and geomorphology. In this way, the role of the cartographic space is to make a certain geographical area claimable as sovereign territory. But should Denmark-Greenland end up being granted sovereign rights to this area, the space will provide the added benefit of enabling the 'coming back' in the sense of knowing the new land much better than before. In that way there is a degree of (scientific) exploration to the Continental Shelf Project, which just serves to underline how little we actually know about the oceans and their underlying features.

Importantly, while Denmark-Greenland has shown its knowledge of the continental shelf through the claim, this knowledge is not made public to the international community before two vital steps have both been completed: Firstly, the CLCS needs to accept the delineation. Secondly, potential overlaps need to be settled with a line of delimitation through bi- or trilateral negotiations. Therefore, it is yet unknown where to draw the territorial boundary until a delimitation has been agreed on with Russia and Canada. The claim is an indication, but it is almost certain that the entire claim will not go to Denmark-Greenland. The expansion is, therefore, only *enabled* through the cartographic space, drawn according to UNCLOS' articles – it is not necessarily determined by it. Nonetheless, the maximization of the claim is the point of departure from which the final territorial space will be determined.

A very important insight, which is brought to light through Strandsbjerg's framework, is that the claim is part of one specific cartographic reality. Other 'realities' exist, which is most obviously illustrated by the fact that the tectonic plates of the Central Arctic Ocean continue to exist and to move in ways unrelated to the drawing of final international borders. As time passes the cartographic reality of space might match the geological reality less and less – the Arctic Ocean is not static, but moves and develops in its own way. Further to this, another reality might exist in which the collective of the human and the non-human folds in a different way – one in which the geology and geomorphology of the Central Arctic Ocean do not have to comply with UNCLOS, but can be presented in purely scientific terms. In this reality, national interest and arbitrary categorizations into submarine ridges and elevations do not dictate how the rocks, sand, clay, and tectonic plates of the Arctic Ocean are made understandable to humans. In this reality, there will still be a center of calculation, but it will consist only of the scientific standards of the disciplines of geology, geophysics, geodesy etc.

Triangulation

In order to try to verify my results, a triangulation is attempted. By triangulating with an independent source, which has been read only *after* my analysis was completed, I might be able to verify some of the results. Specifically, I use Martin Breum's book *Cold Rush* (2018). Martin Breum is a Danish journalist who has made Arctic affairs his specialty. *Cold Rush* investigates various aspects of the "new quest for the polar North" (Breum, 2018, p. front cover), including the Continental Shelf Project. Chapter four is particularly relevant in this context as it is a personal diary written during the LOMROG III expedition. In addition, chapters 1, 6 and 12 mention the project, but not in detail. Martin Breum's personal experience of the data gathering onboard the Oden, and his understanding of the submission in general, are a good way to attempt to verify how my understanding of this matches his. Like me, he is an outsider to the project, but he has been able to observe the project directly. It is, however, important to keep in mind that Martin Breum is a journalist, who has written a book he wishes to sell. Even though Martin Breum is a well-renowned journalist, this aspect should not be forgotten.

That the Continental Shelf Project is a state-led project, created for the national interest of Denmark-Greenland, is the first aspect confirmed by Breum: "The project – the Continental Shelf Project – has been created by the country's top leaders in Copenhagen" (Breum, 2018, p. 70, see also pp. 104 & 107). That the project is an interplay between law, science, and the non-human is also verified by Breum. He writes that the "nature of the expedition" is a "constant interplay between science and the more intangible Arctic wonders" (2018, p. 71), while the data collected has to "supplement the results of the two previous LOMROG expeditions" because the "gathering of proof must fulfil the UN's documentation requirements" (Ibid., p. 73).

That geology is central to the claim is also confirmed by Breum: “The geology of the Lomonosov ridge is decisive in determining who wins the right to the central parts of the ocean floor below the Arctic Ocean” (Ibid., p. 75). Breum also reports the same geological formation history as I have been told, and also notes its significance for the claim (See Breum, 2018, p. 80). Likewise, the interruptive role of the ice in the data gathering process is described extensively. According to Breum, the “scientists will be in constant battle with the polar ice to retrieve data from the ocean floor” (Ibid., p. 72, see also pp. 76-78).

Breum also identifies an economic incentive: “An expansion of the Danish Realm’s domain in the Arctic Ocean can have vital economic and political importance” (Ibid., p. 73). Additionally, he seems to confirm that the project is closely tied to and directed by national interest, not by scientific curiosity when he writes that the scientists onboard “operate almost as scientific law enforcement on orders from the Danish government” (2018, p. 74). He adds that the wish to maximize the claim indeed came from Nuuk, and that this was adhered to by the Danish government at the time (Ibid., p. 206).

That the scientists are the most important in this project is also noted by Breum: “They [Danish scientists and technicians] are the core of this expedition; they are the ones who will secure the expansion of the Danish Kingdom far into the northern-most reaches of the Arctic” (2018, p. 71). This serves to validate the research design itself and the sampling strategy specifically. Moreover, Breum also describes a plethora of disciplines and scientific instruments involved in the expedition (see for instance 2018, pp. 84–85) and his experience seems to support the general outline of the chain of transformation, described in the analysis (see ibid., pp. 70 & 88–89). His account also supports the notion that UNCLOS and CLCS make up the center of calculation (see Ibid., p. 87), but he says nothing about UNCLOS/CLCS’ unpredictability or instability, as noted in the analysis.

Unlike my analysis, Breum spends many pages talking about the North Pole and its cultural and symbolic significance. He notes Christian Marcussen’s reluctance to talk about the pole, but devotes a substantial part of chapter four to describing and analyzing the expedition’s unplanned visit to the pole. In my interviews, the North Pole has only been mentioned in passing or when I have directly asked about it. This, combined with Marcussen’s reluctance to talk to Breum about the North Pole, shows its insignificance for the project. The pole is of no value in the claiming of an extended continental shelf. It adds drama and anticipation to Breum’s account, but according to my data, it is of no significance cartographically.

In general Breum’s account supports the claim that cartographic space enables and precedes the assertion of sovereign rights to a territory – this is made clear in the beginning of chapter four and throughout the chapter (see 2018, pp. 71-72 and 100-1). Certain aspects can, however, not be verified through Breum’s book. Most importantly, the treatment of data to fit UNCLOS and maximize the claim. This is not surprising, seeing that Breum’s chapter is a personal account of LOMROG III, not an analysis of the whole Continental Shelf Project. What can be said, is that nothing in the four chapters directly contradicts any of the results. The verified points of course present themselves stronger than the unverified ones. However, statements which are unverified by the triangulation, but supported by statements from multiple of the informants can still be accepted as valid data. Thus, the triangulation has shown that many results are with great likelihood valid, while other aspects could not be verified through Martin Breum’s book. This does not mean that the research design in general is invalid, but that certain aspects are difficult to validate because of their interpretive character, and/or that some of the results are simply not included in Breum’s book.

Validity and roads to improvement

In order to increase the generalizability of the results, it would be enlightening to undertake a comparative study with another A5-state. The effort put into trying to understand the legal and geological basis for this submission north of Greenland has taken up substantial resources, and therefore left no time for looking into other Arctic coastal states – nor the four other partial submission of the Kingdom of Denmark. Additionally, it could also have been fruitful to interview current and former Danish politicians with an understanding of the project, in order to dig deeper into the purpose of the project and the strategy of maximizing the claim. Time and space limitations have prevented this.

On the technical front, a couple of points also need to be discussed, including operationalization, interview technique, coding, and the presentation of the results. Firstly, it has been difficult to operationalize the very abstract theory. That insightful interview data has been produced, indicates that the operationalization has not been in vain. While the theory concepts and theory questions correspond well to the theoretical framework, the empirical indicators could have been sharper. Some of the indicators overlapped across theory concepts, and even though this is not necessarily a problem in the presentation of the analysis, it did make the coding process difficult and less accurate than it should ideally have been.

Regarding the interview technique itself, a couple of criticisms are also in order. With an aim of presenting the results as openly as possible, I have tried to make my role in the interview sessions clear in the presentation of the results. I have noted when something has been uttered without me suggesting it, and when something has been said as a response to my reflection or understanding of something. This should also be clear from the transcripts, in which I often begin the more complex question with the phrase, “As I understand X, is that also how you see it, or is it more Y or Z or something completely different?”. Throughout the interviews, I have tried to verify the most complex and the central aspects of the data across informants. If IP1 has told me that the aim has been to maximize the claim, then I have asked IP2, IP3 etc. whether this is their interpretation too, but without mentioning the names of specific informants. I have asked open questions as often as possible, and I have tried to avoid influencing the answer given. It has been important to maintain a flexible interview style to allow for unexpected routes to be taken and new insights to be gained. This of course decreases the replicability of the results. In addition, it would not have harmed the interview data had I been a bit more confrontational in my interview style to better expose the interplay between ‘objective’ science and national interest.

With regards to the coding, it is difficult to ensure perfect reliability. The coding has been formed by an abstract theory, and it is a challenge to apply it to the gathered data. But as Brinkmann & Kvale (2015, p. 282) note, if variability, improvisation, and new insights are sought after, the trade-off might be reliability. The coding might have been more precise had there been fewer theory concepts, i.e. coding categories. Perhaps some of the theory concepts should have been excluded or combined to ensure a more simple and applicable coding, but this would have been at the expense of theoretical insights, and theory critique and development would have then been made on an incomplete basis.

In the presentation of the results, I have strived for what Brinkmann & Kvale call “objectivity about subjectivity” (2015, p. 278), meaning as long as an utterance is deemed trustworthy and adds important insight, it has been included. The experiences of the informants have been objectively included by me on the basis of informed judgments. However, a substantial part of the coded interview data has not been included due to space limitations. The most relevant and interesting is presented in the analysis. Perhaps, the

interviews could have been shorter and more to the point, but undoubtedly that would have also led to 'thinner' interview data, and the most complex topics might have been difficult to discuss properly.

Verifying more interpretive interview data is always difficult. Here, this is complicated further by the theory used, in which non-humans are seen as having their own 'voice'. I cannot interview the non-human, and this of course means, that I can only get to know the role of the non-human through the informants (the humans) recounting their experience of the non-human. In order to facilitate an understanding of the non-human's role in the collective, the non-human must be allowed to object, as Latour suggests; "it is by allowing the objects investigated to object to the natural scientists' interventions that maximum objectivity is obtained" (paraphrasing of Latour in Brinkmann & Kvale, 2015, p. 279). This is the aim of investigating the chain of transformation; the non-human's voice can be heard more clearly if the human's interference with it is unraveled in a process of rewinding the scientific process. Unlike the informants interviewed here, I do not have an interest in making the non-human fit into UNCLOS' pre-designed categories so that I can maximize my claim. In that sense, I have perhaps been able to let the non-human unfold itself more than the informants have allowed it to in their research, but with the important limitation that I am neither a geologist, nor a geophysicist. But if Latour's ontological considerations are taken seriously, then I, as a human, can only understand the non-human through human vision, preventing me from ever knowing its true 'nature' or agency. However, I can attempt to know its specific role, its specific way of objecting, in relation to the Continental Shelf Project. That is what I have tried to analyze above.

Conclusion

If one thing is clear from this thesis, it is that Denmark-Greenland's claim to the Central Arctic Ocean is an interpretation of the Arctic Ocean's geological and geomorphological features infused with national interest. The Continental Shelf Project is a means to an end – not a scientific exploration of the Arctic Ocean. That the creation of cartographic spaces always includes decisions on how to let the non-human speak, is something not discussed by Strandsbjerg. This is not to say that maps can be apolitical – they are always political to some extent – but that they relate to the non-human in different ways and with different purposes. Here, the international system of states and the national interest of the individual state very obviously determine what kind of cartographic reality of space we will live in.

That we live in a cartographic reality of space is clear from the process of claiming an extended continental shelf. This is a matter of using cartographic techniques in order to produce a mapped claim, i.e. a cartographic space. The purpose of the delineation and the delimitation process is to attempt to make this cartographic space reality. As Strandsbjerg theorizes, the cartographic space precedes and enables the production of sovereign territory – also in the Continental Shelf Project, though the territory only assigns sovereign rights.

Article 76 is very much built around the idea, that before any state can be allowed to claim anything, the actual lay of the land must be investigated – the cartographic space must be established before it can be made into territory. However, in Strandsbjerg's theory the production of the cartographic space is straightforwardly transformed into sovereign territory in a relatively organic process. This is not the case when UNCLOS is involved. Even when the cartographic space has been produced, it still has to go through the CLCS-process – also if a delimitation agreement already exists. Once this step has been passed, the

delimitation process begins, in which the actual extent of the territory and the sovereign rights to it are established. This may continue for years and end up in an international court or tribunal. In that sense, the enabling effect of cartographic space is also true for the Continental Shelf Project, and in general when a state is using article 76, but it is much more procedural and there are stop signs along the way in the form of a request for more data.

As described, non-humans take up a prominent role in the Continental Shelf Project and the CLCS-process in general. A geological and geomorphological reality exists and the claim made must be based on this. But the non-human is also made to fit the human, political systems and interests. The Lomonosov ridge existed long before the system of sovereign states was invented, but somehow its existence must be fitted into the bid for a part of the Arctic Ocean. Recalling Steinberg & Peters (2013) appeal that we need to "bring the geophysical into relation with the geopolitical, thinking about the materiality of the 'geo' in terms of how we think about the question of geopolitics", we might conclude that The Danish Continental Shelf Project confirms the inevitability of taken geology and geophysics seriously when we attempt to understand and explain international (Arctic) politics. Thinking about Strandsbjerg's framework, we can also conclude that his theory needs more 'geo' to be able to account for the Continental Shelf Project. The map-making of Denmark-Greenland's claim cannot be understood solely from geometric cartography of latitude and longitude, as described by Strandsbjerg. Indirect processes of mapping, such as seismic techniques, magnetic data, and gravitational data are central to the claim made. This is not just necessary because the measured 'land' lies under water, but because it is demanded by UNCLOS. In this way, the non-human's existence and formation history must be accounted for in much more detail than Strandsbjerg's theory suggests.

But if the non-human, the geology of the Arctic Ocean, can only ever be known through human perception and human systems of knowing, is this not just a confirmation of the need for Foucauldian discourse analyses? A return to the notion that no reality exists outside discourse, because reality consists of these discourses? While discourses analyses can reveal important aspects of how we talk about things, and how these things are shaped by discourses, it cannot reveal the process of how non-humans travel into our human (political) systems in the first place, nor how its particularities are shed through stages of reduction. The geological reality exists, and it can be known so far as the chain of transformation can be reversed. As Latour writes,

> In no way is science studies an analysis of the rhetoric of science, of the discursive dimension of science. It has always been an analysis of how language slowly becomes capable of transporting things themselves *without* deformation *through* transformations (1999, p. 96 original emphasis)

While this statement shows the merits of science studies and how such studies can reveal aspects that discourse analyses cannot, it is not true for the continental shelf project that 'things' have travelled 'without deformation through transformation'. Political wishes of maximizing the claim have prevented this, and the claim is thus a particularly political version of 'things'. But the 'things themselves', the geology and geomorphology of the Arctic Ocean, could be transformed without deformations if scientific expeditions without a political mandate were to be sent to the Central Arctic Ocean. Undoubtedly, the scientists of the Continental Shelf Project would have preferred free reins regarding what type of data to collect, but the 330 million Danish kroner spent on the Continental Shelf Project would never have been granted, were it not for the political interest served by the project. The politics of the project is at once its blessing and its curse.

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Appendices

All appendices have been submitted separately.