Security implications of climate change in the Arctic

Kristian Åtland

The Norwegian Defence Research Establishment (FFI)

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Approved by

Johan Aas	Project Manager
Jan Erik Torp	Director

English summary

The melting of the polar ice cap is opening previously inaccessible parts of the Arctic region to resource extraction and marine transportation. If the retreat of the Arctic sea ice continues at its current pace, ice conditions on the northern coasts of Russia and Canada may at some point allow for near year-round shipping through the Northeast and Northwest Passages. Simultaneously, commercially important fish stocks such as cod and capelin are gradually moving north, due to increasing water temperatures. And, perhaps most importantly, technologies are being developed for the utilization of petroleum resources on the Arctic continental shelf, which holds an estimated 31 percent of the world's undiscovered reserves of natural gas, and 13 percent of the world's undiscovered reserves of oil.

As a result of these developments, the Arctic is emerging as a region of major geopolitical significance to the five Arctic coastal states – Russia, the United States, Canada, Denmark, and Norway – as well as to other Arctic and non-Arctic states. Previously non-pressing disputes over access to natural resources and strategic shipping lanes are gradually coming to the surface, raising concerns about a possible "remilitarization" of the region. This report sheds light on these issues and discusses possible long-term security implications of the process of climate change in the Arctic. To what extent, and how, will increasing water temperatures and sea ice melting affect the nature of interstate relations in the region, the Arctic conflict potential, and the orientation of national security strategies in the decades to come? And what can Arctic rim states do to prevent the "worst case" scenario – a destabilization of the region – from materializing?

Sammendrag

Smeltingen av isen i Polhavet er i ferd med å åpne opp tidligere utilgjengelige deler av Arktis for ressursutvinning og skipstrafikk. Dersom nedsmeltningen av polisen fortsetter i sitt nåværende tempo, vil isforholdene i farvannene nord for Russlands og Canadas nordlige kyster en gang i fremtiden kunne tillate nær skipstrafikk gjennom Nordøst- og Nordvestpassasjen i store deler av året. Samtidig er kommersielt viktige fiskestammer som torsk og lodde i ferd med å bevege seg nordover som resultat av økende vanntemperaturer. I tillegg er man i ferd med å utvikle teknologi for utnyttelse av petroleumsressurser på den arktiske kontinentalsokkelen. Det er anslått at om lag 31 % av verdens uoppdagede og uutnyttede gassreserver, og om lag 13 % av verdens uoppdagede og uutnyttede oljereserver, befinner seg i områdene nord for Polarsirkelen.

Disse faktorene er i ferd med å gjøre Arktis til en region av stor geopolitisk betydning, både for de fem arktiske kyststatene – Russland, USA, Canada, Danmark og Norge – og andre arktiske og ikke-arktiske stater. Tidligere ikke-presserende disputter vedrørende tilgangen til arktiske naturressurser og seilingsruter er gradvis i ferd med å komme til overflaten, og det er fra flere hold blitt uttrykt bekymring over faren for en "remilitarisering" av regionen. Denne rapporten kaster lys over disse spørsmålene og diskuterer mulige sikkerhetspolitiske implikasjoner av klimaendringene i Arktis. I hvilken grad, og hvordan, vil økende vanntemperaturer og issmeltingen i Arktis kunne påvirke det mellomstatlige konfliktpotensialet i regionen og nasjonale sikkerhetsstrategier i årene som kommer? Og hva kan de arktiske statene gjøre for å hindre at "worst case"-scenariet – en destabilisering av regionen – materialiserer seg?

Contents

Preface

This report is the second publication from FFI's three-year project "Maritime Security 2030", which was launched in the fall of 2009. In our first study, *Maritime Security 2030: A Strategic Overview*, we identified a number of factors of potential relevance to Norway's maritime security situation in the coming decades. Climate change was here identified as a factor of particular interest. The current report aims to shed more light on the topic of climate change in the Arctic, as well as its direct and indirect security implications.

The report is also an extended, revised, and updated version of a research paper titled "Climate Change and Security in the Arctic", which was presented at the 2010 Annual Convention of the International Studies Association (ISA), held in New Orleans on February 17-20. The author would like to thank the panel chair, Professor Thomas Bernauer, as well as the audience and co-panelists, for sharing their views on the paper and its topic at the ISA Convention.

I would also like to thank those here in Norway who on various occasions have comment on the manuscript and its earlier drafts, including Johan Aas, Per Christian Borgen, Richard Olsen, Tor Bukkvoll, and Rolf-Inge Vogt Andresen at FFI, Oddvin Horneland at the Ministry of Defence, Commodore Nils Johan Holte at the Norwegian Joint Headquarters, and Paal Sigurd Hilde at the Institute for Defence Studies.

Kjeller, May 2010.

Kristian Åtland

1 Introduction

1.1 Climate Change and Security Policy

The effects of global climate change on the physical environment of the Arctic are already very much in evidence. The melting of the polar ice cap is opening up previously inaccessible parts of the region to ship traffic and resource exploration, and issues pertaining to maritime jurisdiction and boundaries in the Arctic Ocean and its adjacent seas are literally coming to the surface. These developments have led to a marked increase in the number of articles and research reports discussing the implications of climate change for state, societal, and human security in the Arctic. Many of the participants in this debate have expressed concern that growing rivalry over access to natural resources and shipping lanes in the region may lead to open political and/or military conflicts between the Arctic (coastal) states, or between Arctic and non-Arctic states.[1]

The purpose of this report is to shed light on the relationship between climate change and security in the northernmost part of the globe. This is a topic that has received significant political and scholarly attention in recent years, particularly after the publication of the IPCC's *Fourth Assessment Report* in early 2007.[2] The issue of climate change, and its long-term implications for global and regional stability, has also been placed on the policy agendas of NATO and the European Union. Speaking at a conference in Reykjavik in January 2009, NATO's outgoing Secretary General, Jaap de Hoop Scheffer, touched on the topics of navigation, resources, and territorial claims, and suggested that the Alliance could play a constructive role in maintaining stability in the High North:

> The Alliance's agenda recently appears to have been dominated by events in Afghanistan, the Caucasus and the Horn of Africa – areas that can rightly be described as "hot". So it is very welcome to shift our attention to a colder region. Having said this, the very reason we are focusing on the High North is because it may not remain so cold in the future. Here in the High North, climate change is not a fanciful idea – it is already a reality – a reality that brings with it a certain number of challenges, including for NATO. […] Although the long-term implications of climate change and the retreating ice cap in the Arctic are still unclear, what is very clear is that the High North is going to require even more of the Alliance's attention in the coming years.[3]

[1] See for instance Scott G. Borgerson: "Arctic Meltdown: The Economic and Security Implications of Global Warming", *Foreign Affairs*, Vol. 87, No. 2 (March/April 2008), pp. 63–77; and Mark Galeotti: "Cold calling: Competition heats up for Arctic resources", *Jane's Intelligence Review*, Vol. 20, No. 10 (October 2008), pp. 9–15.

[2] The Forth Assessment Report of the United Nations Intergovernmental Panel on Climate Change (IPCC), released in 2007, consists of four separate volumes, which are available at http://www.ipcc.ch/.

[3] Speech by NATO Secretary General Jaap de Hoop Scheffer on security prospects in the High North, Reykjavik, Iceland, 29 January 2009, http://www.nato.int/docu/speech/2009/s090129a.html.

Similar signals have come from NATO's current Secretary General, former Danish Prime Minister Anders Fogh Rasmussen, who in October 2009 called attention to the "potentially huge security implications" of climate change. NATO countries should use the Alliance as a forum in which to discuss and address the challenges it creates, said the new NATO chief. He also called for active engagement with Russia in the efforts to reduce security tensions in the Arctic,[4] as did the alliance's Supreme Allied Commander for Europe, Admiral James G. Stavridis, in a speech at the Royal United Services Institute in London three days later.[5]

Also the European Union sees itself as a potentially important player in the Arctic region. Describing climate change as a "threat multiplier", the European Commission and the High Representative for the Common Foreign and Security Policy have in recent reports pointed out that environmental changes are "altering the geo-strategic dynamics of the Arctic" and that this may have "consequences for international stability and European security interests".[6] The EU is in the process of developing an Arctic policy, the primary aim of which is to secure the Union's long-term economic interests in the region and promote "global climate security".

Closely related to the concept of "climate security" is the concept of "environmental security", which has been an integral part of the political terminology of the United Nations ever since the launch of the Brundtland Commission's report *Our Common Future* in 1987.[7] Following the end of the Cold War, efforts have been made – inside as well as outside the UN system – to widen the concept of security.[8] Simply put, the purpose of these efforts has been to include not only military threats, but also threats emanating in other *sectors* (such as the environmental, economic, societal, and political), and threats emanating at other *levels* than that of the state (global, regional, and individual). The "wideners" do not constitute a homogeneous group. They are again divided over *how far* to expand the concept. The "traditionalists", on their part, maintain that if the concept of security is extended to encompass almost every sphere of human activity, it may eventually lose its meaning. What both "wideners" and "traditionalists" seem to agree on is that the global security environment in the past two decades has undergone significant changes, and that this is affecting the role of military forces as well as the nature of civil-military relations. For instance, the impacts of an ice-diminishing Arctic on naval and maritime operations have in recent years been the topic of a series of multi-agency symposia held at the U.S. Naval Academy.[9]

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[4] Speech by NATO Secretary General Anders Fogh Rasmussen on emerging security risks, Lloyd's, London, 1 October 2009, http://www.nato.int/cps/en/natolive/opinions_57785.htm.

[5] Tom Coghlan: "Nato commander warns of conflict with Russia in Arctic Circle", *The Times*, 3 October 2009, http://www.timesonline.co.uk/tol/news/world/article6859007.ece.

[6] "The European Union and the Arctic Region", Communication from the Commission to the European Parliament and the Council, 2008, http://ec.europa.eu/external_relations/arctic_region/docs/com_08_763_en.pdf; "Climate Change and International Security", Paper from the High Representative and the European Commission to the European Council, 3 March 2008, http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/reports/99387.pdf.

[7] United Nations: *Report of the World Commission on Environment and Development: Our Common Future*, 1987, http://www.un-documents.net/wced-ocf.htm.

[8] See for instance the distinction between "state", "societal", and "human security" in *Capable Force: Strategic Concept for the Norwegian Armed Forces*, The Norwegian Ministry of Defence, 2009, http://www.regjeringen.no/upload/FD/Dokumenter/Capable-force_strategic-concept.pdf, pp. 19–21.

[9] See http://www.star.nesdis.noaa.gov/star/IceSymposium2009.php.

Seen from a conceptual standpoint, *environmental* insecurity is fundamentally different from *military* insecurity. As pointed out by Daniel Deudney,[10] Barry Buzan,[11] and Richard Moss,[12] there are many arguments against "securitizing" the issue of environmental degradation. Threats to the environment are usually unintended, and often transcend national boundaries. They have to be dealt with in a collective manner, and usually by non-military means. Placing them in the same category as military threats may complicate, rather than facilitate, their prevention. It may promote state centrism and "us-versus-them" thinking, rather than efficient collective responses. The key question here is not whether the issue of environmental change deserves the attention of researchers and policy-makers, but whether it should be treated as a *security* issue. It can be argued, as some have done, that the challenges of environmental change can be addressed more successfully outside of the security context. Judging from the recent literature on climate change and security, the advocates of a "marriage" between the two concepts do not seem to share one and the same view of what the exact nature of the relationship is – in other words, what it is that makes climate change a security issue.

A central but often neglected question in this regard is whether the impact of climate change on global, regional, national, or human security is *direct* or *indirect*. Some tend to see climate change as a security issue in and of itself (because it threatens the nature environment, and ultimately the existence of the human race), whereas others are more concerned with the role of climate change as a potential driver of intra- and inter-state conflicts (because it may serve as a "multiplier" of other threats and lead to regional instability and violent conflicts).

The latter perspective, focusing on the *indirect* effects of climate change on regional security dynamics, seems to have gained in prominence in recent years, partly at the expense of the former, which is more general in orientation and inherently difficult to operationalize for security analysts and political decision-makers.[13] Examples of indirect effects of climate change on international peace and security include alterations in regional and global patterns of migration, and disputes over access to increasingly scarce natural resources and/or strategically important transport corridors in various parts of the world, including the "global commons", meaning areas outside national jurisdiction.[14]

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[10] Daniel Deudney: "The Case Against Linking Environmental Degradation and National Security", *Millennium*, Vol. 19, No. 3 (1990), pp. 461–476.
[11] Barry Buzan: "Environment as a Security Issue", in Paul Painchaud (ed.): *Geopolitical Perspectives on Environmental Security*, Quebec: The Studies and Research Centre on Environmental Policies, Université Laval 1992.
[12] Richard H. Moss: "Environmental Security? The Illogic of Centralized State Responses to Environmental Threats", in Paul Painchaud (ed.), op. cit.
[13] For a discussion of the relationship between "direct" and "indirect" environmental security risks and how they may affect (U.S.) national security, see Marc A. Levy: "Is the Environment a National Security Issue?", *International Security*, Vol. 20, No. 2 (Fall 1995), pp. 35–62. Joshua Busby distinguishes between the "territorial" and "extraterritorial" effects of climate change, see "Who Cares about the Weather? Climate Change and U.S. National Security", *Security Studies*, Vol. 17, No. 3 (July 2008), pp. 468–504.
[14] See for instance Michèle Flournoy & Shawn Brimley: "The Contested Commons", *U.S. Naval Institute Proceedings*, Vol. 135, No. 7 (July 2009), pp. 16–21.

1.2 Rising Temperatures = Rising Tensions?

As pointed out by Thomas Homer-Dixon, climate change is different from traditional military security challenges, but not necessarily less severe:

> Climate stress may well represent a challenge to international security just as dangerous – and more intractable – than the arms race between the United States and the Soviet Union during the cold war or the proliferation of nuclear weapons among rouge states today.[15]

While recognizing the severity of the challenge and the need for adequate counter-measures, we should not jump to conclusions about the security implications of climate change, or the relationship between climate change and armed conflict. Contrary to the popular perception, there is no "consensus" among scholars that climate change causes conflict, regardless of other factors. The effect of climate change on armed conflict seems to be contingent on a number of *political and social variables* (such as the role of governments, political institutions, and social actors in managing the process of environmental change, mitigating resource pressures, and containing tensions), which, if ignored by analysts, can lead to poor predictions about when and where climate-induced conflict is most likely to occur, and how.[16] The link between climate change and armed conflict is, in other words, far from self-evident. Deterministic and apocalyptic statements about the security implications of climate change may easily turn into self-fulfilling prophecies, rather than help us address the problem at hand. Before we go into the complex dynamics of climate change and security in the Arctic, it is therefore appropriate to take account of the observations and findings made by researchers who have studied the topic from a more general perspective, based on quantitative data from other parts of the world.

As documented in a number of recent studies, the causal links between climate change and armed conflict are much more complex than most people tend to think.[17] A central concept in the IPCC terminology is that of "vulnerability", defined as "the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change".[18] States, groups, and societies that are able and willing to *adapt* to the consequences of climate change seem to stand a better chance of escaping its harmful effects than those that do not. Conversely, societies that are unable or unwilling to adapt, may be left with little other choice than to move to more attractive locations, or engage in "resource conflicts" with their neighbors. This is the essence of the "threat

[15] Thomas Homer-Dixon: "Terror in the Weather Forecast", *The New York Times*, 24 April 2007.
[16] Idean Salehyan: "From Climate Change to Conflict: No Consensus Yet", *Journal of Peace Research*, Vol. 45, No. 3 (2008), p. 315.
[17] Halvard Buhaug, Nils Petter Gleditsch & Ole Magnus Theisen: "Implications of Climate Change for Armed Conflict", Paper presented at the World Bank workshop on Social Dimensions of Climate Change, Washington, D.C., 5–6 March 2008; Clionadh Raleigh & Henrik Urdal: "Climate Change, Environmental Degradation and Armed Conflict", *Political Geography*, Vol. 26, No. 6 (2007), pp. 674–694; Jon Barnett & W. Neil Adger: "Climate Change, Human Security, and Violent Conflict", *Political Geography*, Vol. 26, No. 6, pp. 639–655.
[18] IPCC: *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press 2007, p. 6.

multiplier" mechanism.[19] Resource scarcity is, as pointed out by Homer Dixon, "never a sole or sufficient cause of large migrations, poverty, or violence; it always joins with other economic, political, and social factors to produce its effects".[20]

In order to obtain a better understanding of the relationship between climate change and armed conflict, we need to explore the interplay between climate change and other factors in causing intra- and interstate tensions through mechanisms such as economic destabilization, social fragmentation, and migration. Highly relevant in this regard are the political, economic, and social characteristics of the country or region in question as well as the role of potentially "stabilizing" factors such as international law and multilateral governance and institutions. As observed by Buhaug et al., economically developed and politically stable societies are better equipped to handle climate-induced environmental change than societies that are characterized by other conflict-prone features, such as "bad governance, large and heterogeneous populations, social inequalities, bad neighborhood, and a history of violence".[21] Thus, politically unstable and poorly developed regions such as sub-Saharan Africa may experience far more severe consequences from climate change than politically stable, resource-rich, and relatively well institutionalized regions such as the Arctic.

That being said, it should be noted that climate change *under certain conditions* may lead to rising tensions also in the northernmost part of the globe. The region's growing economic significance, combined with the continued presence of a number of unresolved issues of international, and particularly maritime, law, adds to the long-term conflict potential in the region. As the polar ice recedes, the region will become more accessible to state and non-state actors, and commercial activities such as fisheries, petroleum extraction, marine transportation, cruise traffic, polar research, and so on, may increase. This may in turn place new demands on the ability of Arctic states to maintain stability and provide on-site regulation of, and assistance to, new activities. The coast guard, naval, and air forces of Arctic coastal states may be required to take a more active role in areas such as resource management, ocean surveillance, search and rescue operations, border control and law enforcement at sea, strategic presence, etc.

The long-term security implications of climate change for Arctic states and societies are hard to predict, and there are many uncertainties associated with their nature, scope, and severity. But this should not deter the research community from raising the issue and discussing it in a systematic manner. Failure to take the climatic factor into account in security policy and defense planning may leave governments poorly prepared to deal with the multi-faceted consequences of climate change in the Arctic and jeopardize not only vital economic and national security interests but also the political, military, and ecological stability of the region as a whole.

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[19] See for instance "Climate Change and International Security", op. cit., p. 2; and *National Security and the Threat of Climate Change*. Alexandria, VA: Center for Naval Analyses Corporation, 2007, p. 44.
[20] Thomas Homer-Dixon: *Environment, Scarcity and Violence*. Princeton, NJ: Princeton University Press 1999, p. 16.
[21] Buhaug, Gleditsch & Theisen 2008, op. cit., p. 20.

1.3 Outline of the Report

This report consists of five chapters. Chapter 2 gives a brief overview of the Arctic region. It introduces the region's physical characteristics, the perspectives of the five states that surround it, and current inter-state disputes related to borders, jurisdiction, and shipping lanes. Chapter 3 delves into the topic of Arctic climate change, based on findings made inter alia in the *Fourth Assessment Report* of the United Nations Intergovernmental Panel on Climate Change (IPCC, 2007), and in the Arctic Council's *Arctic Climate Impact Assessment* (ACIA, 2005). This chapter will mainly explore the "direct" (environmental) security implications of climate change. Chapter 4 seeks to shed light on the "indirect "implications, that is, the effects of climate change on the intra- and interstate conflict potential in the region. The report's findings and conclusions are summarized in the 5th and final chapter.

2 The Arctic as a Geopolitical Arena

2.1 Physical Characteristics of the Arctic

Contrary to popular belief, the northernmost part of the globe is very different from the southernmost. Whereas Antarctica is a continent surrounded by water, the Arctic is an ocean surrounded by land. The climatic conditions are harsh both places, but the mean average temperature at the South Pole (-45°C), located 2836 meters above the sea level, is considerably lower than at the mean average temperature at the North Pole (-15°C), located on top of 2-3 meters of sea ice above a more than 4000 meters deep ocean.

Geographically, the Arctic region can be defined as the area located north of the Arctic Circle, which runs approximately 66°34′03″ north of the Equator (see Figure 2.1).[22] With its radius of 2606 kilometers, the Arctic Circle encapsulates as much as eight percent of the planet's surface. The Arctic region can also be defined by the 10º C isotherm,[23] which goes somewhat further south in the marine areas and also includes all of Greenland, most of Iceland, and the Aleutian Islands. In addition to the Arctic Ocean, the region includes at least nine Arctic or near-Arctic seas[24] and the northernmost parts of the land territories of eight sovereign states.[25]

[22] The Arctic Circle marks the southern extremity of the midnight sun, that is, the southernmost point where the sun is above (and below) the horizon for 24 continuous hours at least once a year.
[23] The 10º C isotherm is an imaginary line based on mean temperature measurements in the month of July. The AMAP (Arctic Monitoring and Assessment Programme) area extends even further south, establishing an appropriate geographical context for its assessment. For some analytical purposes, makes sense to include various sub-Arctic terrestrial and marine areas (such as Asia north of 62ºN, North America north of 60ºN, the waters north of the Aleutian Islands, Hudson Bay, and parts of the Atlantic Ocean, including the Labrador Sea), as well as the major rivers that empty into the Arctic Ocean (such as Ob and Yenisei).
[24] Going eastwards from the Greenwich meridian: The Norwegian Sea, the Barents Sea, the White Sea, the Kara Sea, the Laptev Sea, the East Siberian Sea, the Chukchi Sea, the Beaufort Sea, and the Greenland Sea. One may also include the Hudson Bay, the Hudson Strait, the Lincoln Sea, the Baffin Bay, the Davis Strait, and the Labrador Sea.
[25] Norway, Sweden, Finland, Russia, the United States, Canada, Denmark (Greenland), and Iceland.

Figure 2.1: The Arctic Region.[26]

[26] The figure is based on maps from the Perry-Castañeda Map Collection, University of Texas, available at http://www.lib.utexas.edu/maps/islands_oceans_poles/arctic_region_pol_2007.jpg.

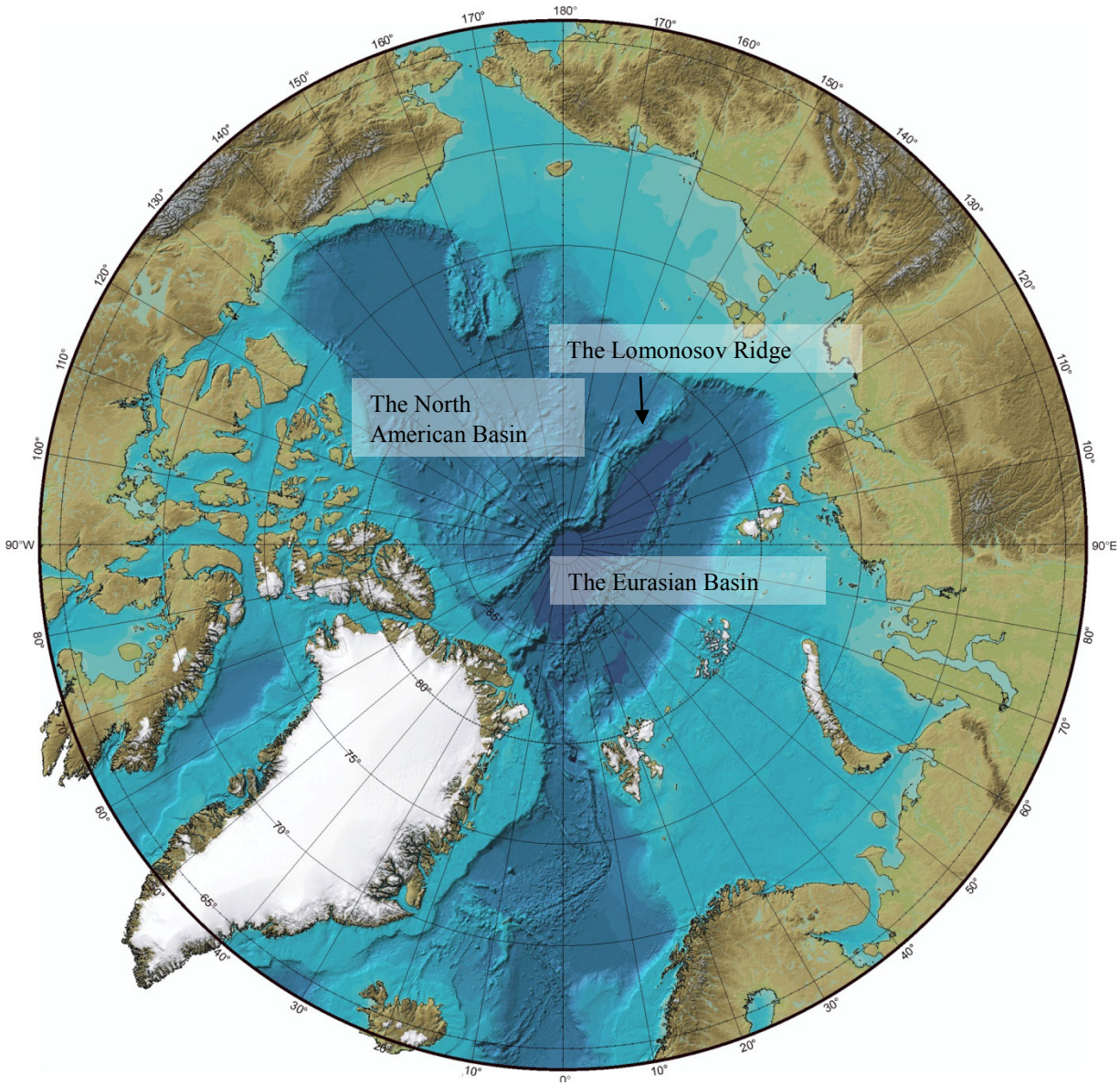

Figure 2.2: Bathymetric map of the Arctic Ocean.[27]

Attempting to understand the strategic and economic significance of the Arctic region and how it may be affected by the dynamics of global climate change, we may start by taking a look at the underwater topography of the Arctic Ocean and its surrounding coastal regions. Within the Arctic Circle, we find deep oceanic waters as well as shallower littoral waters. Across the Arctic Ocean from the Chukchi Sea to Ellesmere Island and Greenland goes a distinct underwater ridge, the Lomonosov Ridge, which rises some 3000 meters above the abyssal plain and divides the ocean in two oceanic basins: the North American and the Eurasian (see Figure 2.2). The Arctic Ocean is in average 1,038 meters deep, and its deepest point, which is found in the Eurasian Basin, east of the Lomonosov Ridge, is at 5,450 meters. But the continental shelf that surrounds the ocean is shallow and wide, particularly on the Eurasian side. The coastal regions are more accessible to

[27] http://www.ngdc.noaa.gov/mgg/bathymetry/arctic/currentmap.html.

commercial shipping and resource extraction than the deep and (in winter) mostly ice-covered central part of the Arctic Ocean.

2.2 The Arctic Coastal States and their Interests

The circumpolar coastline of the Arctic Ocean is 45,389 kilometers long. Five states – Norway, Russia, the United States, Canada, and Denmark – have a coastline on the Arctic Ocean, whereas the remaining three Arctic states – Sweden, Finland, and Iceland – do not. The "Arctic Five", meaning the Arctic coastal states, have a special role to play in sorting out current and future legal disputes in the region, managing the region's fragile marine environment, and laying the foundations for a politically stable situation in the region.

None of the Arctic coastal states envisage a comprehensive, region-specific legal regime similar to that of Antarctica (the Antarctic Treaty). Rather, they see the 1982 UN Convention on the Law of the Seas (UNCLOS) as the basis of their policy towards the region. All of the five Arctic coastal states have signed the Convention, and all but one have ratified it.[28] They all emphasize the necessity of resolving jurisdictional disputes in a peaceful manner, through bilateral and multilateral negotiations, and in correspondence with UNCLOS procedures.

This is not to say that there is no potential for conflicts between the Arctic five (the coastal states), the Arctic eight (the members of the Arctic Council), or within and between Arctic and non-Arctic states. At the sub-state as well as at the state level, there are numerous stakeholders, and their interests are not always coinciding. In recent years, when increasing attention has been devoted to the region's long-term potential as a strategic resource base, it has become customary, not least in Russia, to talk about the region in geopolitical terms. The relationship between *interests*, *power*, and *geography* has again caught the attention of researchers and decision-makers. 'Geopolitics', a term coined at the beginning of the 20th century by the Swedish political scientist Rudolf Kjellén, seems to have had a renaissance.[29]

Obviously, there are different ways to approach the topic of inter-state relations in the Arctic, analytically as well as strategically. Not all would applaud "the return of geopolitics" or encourage a strategy or military muscle-flexing vis-à-vis other states bordering the Arctic. Such an approach may well lead to the remilitarization and destabilization of a region that is currently among the most peaceful and stable parts of the world. Neoliberal institutionalists, on their part, would probably tone down the 'geopolitics' dimension and highlight the need for a strengthening of Circum-Arctic institutions such as the Arctic Council. Regardless of our standpoint in the "grand debates", we may benefit from a closer look at the Arctic coastal states (Russia, the United States, Canada, Denmark, and Norway), their officially defined Arctic interests, and how they envisage attaining their long-term objectives in the region.

[28] Norway ratified it in 1997, Russia in 1997, Canada in 2003, and Denmark in 2004. US ratification is still pending.

[29] Cf. for example Ola Tundander: "Geopolitics of the North: *Geopolitik* of the Weak. A Post-Cold War Return to Rudolf Kjellén", *Cooperation and Conflict*, Vol. 43, No 2 (2008), pp. 164–184.

A natural place to start is *the Russian Federation*, which is the world's most prominent Arctic power. By virtue of its size, geographical location, and the length of its northern coastline, Russia is destined to remain a key player in international Arctic affairs. Five hundred kilometers off the coast of the Kola Peninsula lies the world's biggest offshore gas field – the Shtokman field – waiting to be developed. Recent developments such as the post-2007 global financial crisis and the discovery of vast natural gas reserves from shale rock formations in the U.S., Europe, and elsewhere have lead to a fall in gas prices on the world market and the temporary postponement of this and other costly offshore projects in the Arctic. In the period from 2000 to 2008, Russia experienced significant economic growth, fueled by high oil prices on the world market. This put the country in a position to start modernizing its armed forces, including the nuclear arsenal on the Kola Peninsula. Russia has also resumed patrols with long-range bombers in the international air space over the Barents, Norwegian and Greenland Seas, as well as SSBN patrols under the Arctic ice. New weapon systems, including a new generation of sea-launched ballistic missiles (SLBMs), are being tested in the Barents and White Seas. Russia's strategic interests in the Arctic are closely related to the country's economic interests in the region. The current rearmament efforts are motivated not only by superpower nostalgia, but also by a widespread fear that other Arctic states may be tempted to take control over waterways and natural resources that are perceived as Russian. In Soviet times, the entire "sector" between the meridians 32° Eastern and 168° Western longitude was treated as Soviet internal waters, in reference to the 1926 "Sector decree". In the decree, all lands and islands located in the sector, discovered as well as undiscovered, were declared Soviet territory. The applicability of the Soviet Sector decree to contemporary maritime law is highly contested. Nevertheless, the principle has a special place in Russian thinking with regard to the Arctic.[30] The Arctic shelf claim that Russia is currently preparing, is slightly more modest than the sector claim, but not much. Russia's "North Pole claim" is generally in line with the country's new assertiveness in international affairs and the efforts to rebuild Russia as an economic, political and military great power. In the short term, however, the expectations of economic gains from the Arctic shelf may turn out to be grossly overestimated, as the country does not yet have the technologies or financial means to develop fields there. But the claim is also inspired by emotions and the country's long history of exploration and activity in the Arctic.

The United States is an Arctic nation by virtue of its 49th state – Alaska – which was purchased from tsarist Russia in 1867. Located in the far northwestern corner of the North American continent, Alaska is the largest U.S. state and plays an important role both economically and strategically. In the days of the Cold War, Americans feared a trans-arctic attack by inter-continental ballistic missiles (ICBMs) launched from the Soviet mainland, missiles launched from Soviet nuclear submarines in the Barents Sea or the Arctic Ocean, or bombs dropped by long-range nuclear bomber planes. This led to the development of extensive air and missile defense systems in the Arctic. In 1961, a Ballistic Missile Early Warning System (BMEWS) radar was constructed at the Thule Air Base in the northwestern Greenland. At this time, Thule had a population of several thousand people and featured significant amounts of military hardware. The

[30] Leonid Timtchenko: "The Russian Arctic Sectoral Concept: Past and Present", *Arctic*, Vol. 50, No. 1 (1997), p. 34.

Thule air base has been downsized considerably since then, but is still in operation. Since the end of the Cold War, the deployment of a new National Missile Defense (NMD) system has been a priority in US defense strategy. In the summer of 2001, the Bush Administration announced that it would seek funding to develop a new missile defense test bed, with interceptors located in Alaska. When it comes to the issue of possible U.S. shelf claims in the Arctic Ocean, outside the 200 nautical miles line, these are still pending, since the U.S. has not yet ratified the UN Convention on the Law of the Sea (UNCLOS). The need for U.S. UNCLOS ratification was highlighted in National Security Presidential Directive No. 66, signed in January 2009. This directive outlines the main elements of America's new Arctic Region Policy and states that "the United States has broad and fundamental national security interests in the Arctic region and is prepared to operate either independently or in conjunction with other states to safeguard these interests".[31] The directive also highlights the region's potential as an arena for offshore petroleum activities and shipping. In the North Slope of Alaska, petroleum activities have long been an important part of the U.S. economy. In the future, expansion of activities into the offshore domain north of Alaska may become a reality.

Canada controls the second largest part of the Arctic. The political entities of the Canadian North – Yukon, the Northwest Territories, and Nunavut (which includes the Hudson Bay islands) – all have a harsh climate and are relatively sparsely populated. This is particularly the case in the Canadian "far North", which refers to the part of the country that is located north of the Arctic Circle. As in the case of Russia, the sector principle has a certain merit in Canadian thinking with regard to the Arctic. Canada claimed the sector between 60°W and 141°W longitude, extending all the way north to the North Pole, as early as in 1925. All islands in this region, and the waters surrounding them, were claimed to be Canadian.[32] In 1985, Canada drew straight baselines around the outer limits of the islands constituting the Canadian archipelago, claiming the waters between them as "historic internal waters."[33] This essentially made the sector claim redundant, but Canada's position with regard to the legal status of the waters surrounding the country's Arctic islands is still contested. The U.S. is one of the countries which does not recognize Canada's Arctic water claims, and has allegedly sent nuclear submarines under the ice near Canadian islands without obtaining permission from, or even notifying, the Canadian government. As the Arctic ice cap retreats, new conflicts may arise between Canada and other Arctic nations, most notably the U.S., over the legal status of the straits along the Northwest Passage, as well as the inlet to the Bay of Fundy, where the Canadians are planning to put a ban on supertanker traffic.[34] Conflicts may also arise between Russia, Canada and Denmark over parts of the Arctic shelf, as it may be argued that the Lomonosov Ridge is an extension not only of Russia's Siberian Shelf, but also the Canadian shelf north of Ellesmere Island, or the Danish shelf north of Greenland.

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[31] "Arctic Region Policy", National Security Presidential Directive (NSPD-66) and Homeland Security Presidential Directive (HSPD-25), 9 January 2009, http://www.fas.org/irp/ offdocs/nspd/nspd-66.htm.
[32] "The Atlas of Canada", http://atlas.nrcan.gc.ca/site/english/maps/historical/territorialevolution/1927/1.
[33] S.K. Verma: *An Introduction to International Law*. New Delhi: University of Delhi 1998, p. 123.
[34] "Canada may ban gas tankers from key passage", *Portland Press Herald/Maine Today*, 11 September 2007, http://pressherald.mainetoday.com.

As far as *Denmark* is concerned, it should be noted that the world's largest island, Greenland, is a Danish territory, but unlike mainland Denmark it is not a member of the EU, and largely self-governed. In contrast to the archipelago of Svalbard, Greenland has a number of American military installations and plays an important role as a strategic outpost in the northeastern corner of the North American continent. When it comes to the Arctic continental shelf, Denmark is the only EU country in position to file a claim to shelf areas beyond the 200 nautical mile zone. A Danish claim to a shelf north of Greenland, maybe including the North Pole, is likely to be partially overlapping with Canadian and Russian claims. Denmark also has a territorial dispute with Canada over the tiny Hans Island, located in the Nares Strait, a waterway that runs between Ellesmere Island and Greenland. It should also be mentioned that there is a potential for conflicts between the different EU member states, even though the Union itself obviously has many of the characteristics of a state.

Norway is another important state actor in the Arctic, and particularly the European Arctic. The country has a long tradition of Arctic expeditions and commercial activities north of the Arctic Circle. Today, Norway is one of the world's leading petroleum nations and has jurisdiction over a maritime area more than six times the size of its land territory. The High North has been singled out as Norway's most important strategic priority area, and considerable resources are being devoted to the day-to-day enforcement of Norwegian sovereignty and authority in northern waters. This includes the management of the Barents Sea's living marine resources – a task which is being undertaken in cooperation with Russia. Norway is the first country to start large-scale petroleum operations in the Barents Sea, at the Snøhvit gas field located 140 kilometers off the coast of Finnmark. The Norwegian coast is also trafficked by Russian oil tankers transporting crude oil from Western Siberia to European and American markets. For obvious reasons, environmental concerns related to the extraction and transit of petroleum in and through the Barents Sea, as well as the handling of defense-related radioactive waste on the Kola Peninsula, figure high on the Norwegian-Russian agenda. In addition to Norway's "soft security" challenges in the Euro-Arctic region, there are also a number of potential "hard security" challenges related to the increasing Russian military activity in the region. The lack of a clear boundary line between the two countries' continental shelves and economic zones in the Barents Sea is also a source of concern.

2.3 Current Disputes over Borders and Jurisdiction

Compared to other and more busy maritime areas, such as the Persian Gulf or the South China Sea, the Arctic is generally a stable and peaceful place, and interstate relations in the region are generally pragmatic and straightforward. Nonetheless, there are a number of unresolved issues pertaining to borders and jurisdiction also in the northern waters and shelf areas, which under certain scenarios may become "securitized". Given the region's gradually increasing economic significance to the Arctic coastal states and the rest of the world, one should be aware of the possibility that new disputes may arise in the region, and that attempts can be made to settle disagreements by "non-diplomatic" means, including the use of military force.

The list of currently unresolved or pending disputes and disagreements over borders and jurisdiction in the northern waters includes issues such as (1) the delimitation of Norway's and Russia's economic zones and continental shelves in the Barents Sea, (2) the legal status of the Svalbard Fisheries Protection Zone and the shelf area around Svalbard (Norway and Russia, primarily), (3) the delimitation of the Bering Sea (U.S. and Russia), (4) the delimitation of Beaufort Sea (U.S. and Canada), (5) the disputed status of Hans Island in the Nares Strait between Ellesmere Island and Greenland (Canada and Denmark), (6) the legal status of the Northwest Passage (Canada and the U.S.), (7) the legal status of the Northern Sea Route (Russia and the U.S., primarily), and (8) the delimitation of the Arctic continental shelf beyond 200 nautical miles (Russia, Canada, and Denmark, primarily). Each of the eight issues is introduced below.

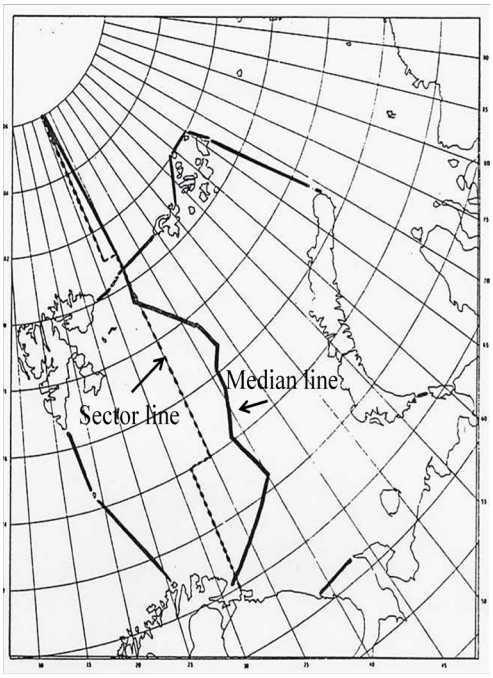

Figure 2.3: The Norwegian-Russian delimitation dispute in the Barents Sea. The disputed area was located between the "sector line" and the "median line".

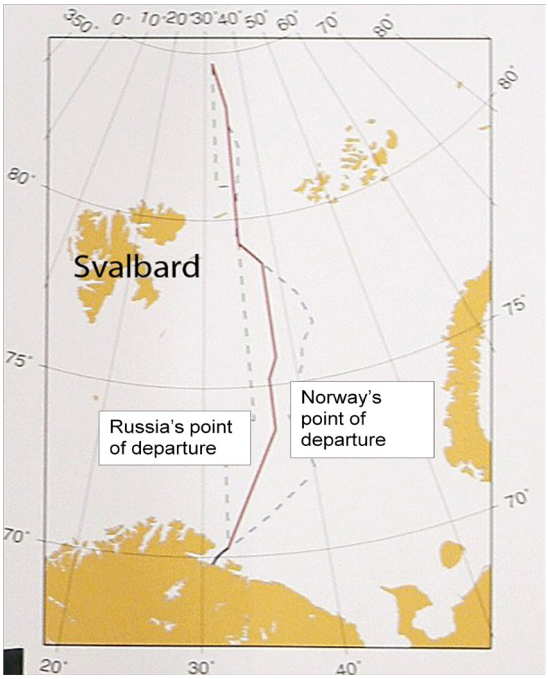

Figure 2.4: The "compromise line", agreed upon during President Medvedev's state visit to Norway in April 2010, divides the disputed area in two parts of almost the same size.

In the Barents Sea and the Arctic Ocean, Norway and Russia (formerly the Soviet Union) have until recently had an unresolved bilateral delimitation issue related to the two countries' continental shelves and economic zones. Since the early 1970s, Norway has argued that the boundary should follow the "median line", whereas Russia has claimed the so-called "sector line", as did the Soviet Union.[35] The discrepancy between the two claims gave a disputed area (see Figure 2.3) of some 155,000 square kilometers, or roughly 11 % of the Barents Sea, including shelf areas containing potentially significant petroleum resources. However, during President Medvedev's visit to Oslo on 26-27 April 2010, Prime Minister Jens Stoltenberg and President Dmitriy Medvedev announced that "preliminary agreement" had been reached on the

[35] Cf. Leonid Timchenko: "The Russian Arctic Sectoral Concept: Past and Present", *Arctic*, Vol. 50, No. 1 (March 1997), pp. 29–35.

drawing of a permanent boundary line, after almost 40 years of negotiations, and that only some "technical control work" remained before a final treaty could be signed.[36] The (tentatively) agreed-upon delimitation line, known as "the compromise line", divides the overall disputed area in "two parts of approximately the same size", as illustrated in Figure 2.4. If and when a maritime delimitation treaty is signed and ratified and enters into force, it will make it clear which state's jurisdiction is to apply in which parts of the currently disputed area. This is essential for ensuring regional stability and predictable conditions under which commercial and other actors can operate.

In addition to the delimitation dispute in the Barents Sea, Norway and Russia have differing interpretations of the 1920 Svalbard Treaty, which granted Norway 'full and absolute sovereignty' over Svalbard (article 1).[37] Under articles 2 and 3 of the Treaty, the nationals of all parties to the Treaty 'enjoy equally the rights of fishing and hunting' and may engage in 'all maritime, industrial, mining and commercial operations on a footing of absolute equality'. Norwegian regulatory measures on and around Svalbard have often been perceived in Russia as infringements on the latter articles. As far as the maritime areas around Svalbard are concerned, Norway maintains that the Svalbard Treaty's provisions apply only to the land and sea territory of the archipelago. Russia (and other parties to the Treaty) contest Norway's claim to exclusive rights in areas beyond the territorial waters of the archipelago, and have questioned the legal basis of the Svalbard Fisheries Protection Zone, which is a 200 nautical mile zone of non-discriminatory Norwegian fisheries jurisdiction, established in 1977. Another potential source of contention is the continental shelf around the archipelago, particularly outside the 12 nautical mile territorial line. Norway rejects the notion of a separate "Svalbard shelf" and insists that the shelf area around Svalbard is part of, and enjoys the same legal status as, Norway's northern continental shelf, which stretches from mainland Norway across the Barents Sea and further towards the Arctic Ocean north of Svalbard.

Russia has an unresolved maritime boundary issue also in the Northeast. In the Bering Sea, which like the Barents Sea is extremely rich in living marine resources, the Soviet Union and the United States agreed on a delimitation in 1990, which was ratified by the U.S. the following year. The negotiated delimitation line represents a compromise between the equidistance line (preferred by the U.S.) and the sector line (preferred by the Soviet Union/Russia), and it runs some 2575 kilometers from the Bering Sea into the Arctic Ocean. But the treaty, which was signed by Foreign Ministers Eduard Shevardnadze and James Baker, has yet to be ratified by Russia, and has therefore not entered into force, at least not formally (only provisionally). There is also an area beyond the two countries' EEZs where fisheries are regulated by a separate bilateral agreement from 1992 (moratorium on pollock fishing).[38]

[36] The Norwegian Ministry of Foreign Affairs: "Joint Statement on Maritime Delimitation and Cooperation in the Barents Sea and the Arctic Ocean", signed by Foreign Ministers Jonas Gahr Støre and Sergey Lavrov in Oslo on 27 April 2010, http://www.regjeringen.no/upload/UD/Vedlegg/Folkerett/030427_english_4.pdf.
[37] The text of the Svalbard Treaty is available at http://www.lovdata.no/traktater/texte/tre-19200209-001.html.
[38] Alf Håkon Hoel: "Jurisdictional Issues in the Arctic: An Overview", paper presented at the "Emerging from the Frost" Conference, Tromsø, Norway, 25–26 September 2007.

Further to the east, in the Beaufort Sea, the United States and Canada has a dispute over a wedge-shaped maritime area of 21,436 square kilometers north of Alaska and Canada's Yukon Territory. Here too, the U.S. claims that the maritime boundary should extend along a path equidistant from the coast of the two nations, whereas Canada maintains that the boundary should follow the land boundary and the 141st meridian (Canada's western "sector line"). No agreement has been reached, partly because the U.S. has not ratified the UN Law of the Sea Convention from 1982. In August 2009, the U.S. announced a moratorium on fishing in the Beaufort Sea, including the disputed area, which led to a Canadian diplomatic protest note.[39] The disputed area may also hold significant hydrocarbon resources. Should the U.S. ratify the UNCLOS, the dispute may potentially be settled by an international tribunal.

Canada also has an unresolved boundary dispute with Denmark, relating to the delimitation in the Nares Strait between Ellesmere Island and northern Greenland. When the two countries in 1973 agreed on the coordinates of their maritime border in the Nares Strait, they drew a geodesic line through 127 points (latitude and longitude) from Davis Strait to the end of Robeson Channel, where Nares Strait runs into Lincoln Sea. The 1973 treaty does not, however, draw a line from point 122 (80° 49' 2 - 66° 29' 0) to point 123 (80° 49' 8 - 66° 26' 3), a distance of 875 meters. Hans Island is situated in the centre of this area. In recent years, official representatives of Canada and Denmark have intermittently visited the island and planted their respective flags there (along with a bottle of their finest domestic liquor). Beyond that, the dispute is considered unproblematic, in Ottawa as well as in Copenhagen.

Between the Atlantic and Pacific oceans, from Banks Island in the west to Baffin Island in the east, goes a network of sailing routes, known as the Northwest Passage. The network stretches about 2,400 kilometers across the entire Canadian Arctic archipelago, which comprises approximately 36,000 islands.[40] There are currently five recognized routes or passages through the archipelago, with variations, depending on the entrance point, transit direction, and the time of year. The legal status of these passages is disputed. Canada considers them to be part of its *internal waters* under the Law of the Sea Convention (UNCLOS), whereas the United States and other maritime nations consider them to be *international straits*. The Canadian archipelago is sparsely populated, but ice conditions along the route appear increasingly favorable to domestic and foreign ship traffic. Global warming is likely to open the passage for longer parts of the year, maybe even on a year-round basis. This may turn the Northwest Passage into an international shipping route and lead to an increased focus on its disputed legal status.

When it comes to the northern waterway between the Atlantic and Pacific Oceans – the Northern Sea Route – commercial navigation is still fairly limited, as it is in the Northwest Passage. Here too, there are a number of potentially problematic legal issues such as the status of the straits along the route (whether they are "Russian" or "international"). The United States has protested

[39] Randy Boswell: "Canada files protest over U.S. fishing ban in Arctic Ocean", *Canwest*, 19 October 2009, http://www.canada.com/news/Canada+files+protest+over+fishing+Arctic+Ocean/1959483/story.html.
[40] Arctic Council: *Arctic Marine Shipping Assessment Report 2009*, http://web.arcticportal.org/uploads/4v/cb/4vcbFSnnKFT8AB5lXZ9_TQ/AMSA2009Report.pdf, p. 20.

to Russia's claims that the straits along the Northern Sea Route are to be regarded Russian internal waters. The U.S. argues that the straits in question are international, and that they can be used for international navigation. Today, all commercial ships transiting the route must adhere to a restrictive Russian regime and pay substantial fees. *Sovkomflot*, the region's leading Russian shipping company, has in recent years begun to explore the prospects for shipments of oil and gas along parts, and possibly the entire length, of the Route.[41] This could, at least in theory, connect Russia's oil and gas fields in Western Siberia with the rapidly growing energy markets in Asia. Still, there are a number of environmental, legal, and regulatory issues that need to be sorted out before the route can become a viable alternative to the Suez Canal.

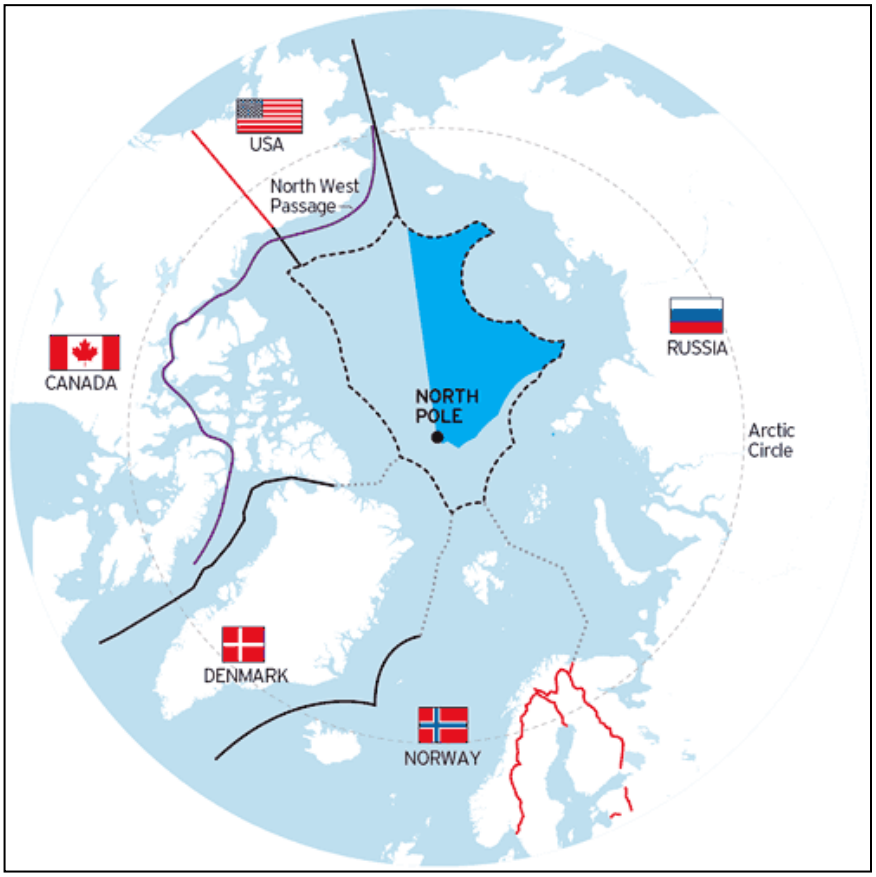

Figure 2.5: The Arctic coastal states, and Russia's shelf claim (dark blue).[42]

Finally, there is the issue of coastal state claims to shelf areas beyond the outer boundaries of their exclusive economic zones (EEZs), that is, beyond 200 nautical miles from the baseline. Under the terms of the UN Law of the Sea Convention (Article 76), coastal states are eligible to claim control over continental shelves in the central part of the Arctic Ocean. All of the five Arctic coastal states, including the U.S., which has not ratified the Convention, have done

[41] Barentsobserver: "Russia ready to ship oil along Northern Sea Route", posted 27 October 2009 at http://www.barentsobserver.com/russia-ready-to-ship-oil-along-northern-sea-route.4647141-16178.html.

[42] "Outer limits of the continental shelf beyond 200 nautical miles from the baselines: Submission by the Russian Federation", http://www.un.org/Depts/los/clcs_new/submissions_files/rus01/RUS_CLCS_01_2001_LOS_2.jpg.

extensive surveying of the sea bottom in the relevant parts of the northern waters, in order to obtain data that can substantiate their claims. Shelf claims are dealt with on a case- by-case basis by the UN Continental Shelf Commission, which makes recommendations regarding their persuasiveness based on the data that has been made available. Russia and Norway have already filed such claims (in 2001 and 2006, respectively). The latter was, with some minor exceptions, recommended by the Continental Shelf Commission in April 2009. The Russian claim, which at first was neither rejected nor approved due to lack of documentation, is likely to be resubmitted in the near future. It encompasses a shelf area of 1.2 million square kilometers between Eastern Siberia and the North Pole (see Figure 2.5). Canada, Denmark, and the U.S. (pending UNCLOS ratification), are likely to file claims of their own. These claims may turn out to be partially overlapping, particularly in the cases of Russia, Canada, and Denmark. All of the three countries argue that the Lomonosov Ridge is a natural continuation of their respective continental shelves. This and other underwater structures are in other words likely to figure centrally in the deliberations. It needs to be pointed out, however, that the Arctic coastal states' right to a continental shelf beyond their respective EEZs will not affect the rights and freedoms that other states enjoy in the High Seas portion of the Arctic Ocean, such as the right of innocent passage.

Despite the presence of unresolved issues such as the ones listed above, the Arctic is generally a stable and peaceful region, and the long-term conflict potential should not be exaggerated. There seems to be consensus among Arctic and non-Arctic nations that UNCLOS applies also to the Arctic Ocean, and that there is no need for a region-specific legal regime à la the Antarctic Treaty. The five Arctic coastal states' commitment to finding peaceful solutions to outstanding issues through diplomacy and negotiations, in accordance with the existing Law of the Sea framework, has been reiterated on a number of occasions, for instance in the joint declaration signed at the Arctic Ocean Conference in Ilulissat, Greenland, in May 2008.[43]

On the other hand, one should not underestimate the potential for interstate disputes and conflicts over the access to the land and shelf areas inside the Arctic Circle, which according to the U.S. Geological Survey conceal as much as 30 percent of the world's undiscovered reserves of natural gas, and 13 percent of the undiscovered reserves of oil.[44] This estimate is well known within as well as outside the region. As the polar ice recedes, new energy provinces may be opened, offshore as well as onshore. The Arctic Ocean may become an important arena for marine transportation, not only through the Northwest and Northeast Passages, but possibly also along sailing routes further north, particularly in the summer months. The *symbolic* value of the North Pole to at least some Arctic nations, most notably Russia, Canada, and Denmark, is also worth noting. This was illustrated by the Russian flag planting on the North Pole seabed in August 2007, and the international reactions that it provoked. These issues will be discussed in greater detail in Chapter 4.

[43] The text of the declaration is available at http://www.oceanlaw.org/downloads/arctic/Ilulissat_Declaration.pdf.

[44] USGS: "90 Billion Barrels of Oil and 1,670 Trillion Cubic Feet of Natural Gas Assessed in the Arctic", press release, posted 23 July 2008 at http://www.usgs.gov/newsroom/article.asp?ID=1980&from=rss_home.

3 Climate Change and the Arctic Environment

Drawing on findings and scenarios from the 2007 *Fourth Assessment Report* of the IPCC, and the 2005 *Arctic Climate Impact Assessment*, a study initiated by the Arctic Council (AC) and the International Arctic Science Committee (IASC), this chapter will discuss important aspects of the process of anthropogenic (human-caused) change in the northernmost part of the globe, and its impacts on the Arctic environment.

3.1 Polar Ice Melting

For the next two decades, and based on a wide range of greenhouse gas emissions scenarios, the IPCC projects a global temperature increase of at least 0.2 ºC per decade.[45] The warming, and related changes in the environment on land, at sea, and in the air, will vary from region to region around the globe, as it has in the past. The average temperature in the Arctic has in the past few decades risen at almost twice the rate of the rest of the world, and this trend is projected to accelerate throughout the 21st century.[46] Temperature increases in the Arctic, largely caused by developments outside the region, feed back into the global climate system in a variety of ways, most notably by reducing the reflectivity of the ocean's surface. Thus, changes in the Arctic sea ice cover, changes in the snow cover over Arctic land areas, glacier melting, sea level rise, changes in ocean currents, permafrost thawing, coastal erosion, and so on, are a concern not only for those who inhabit the region, but also the outside world.

Polar ice melting has in recent years been, and is likely to remain, a central issue on the research agenda of polar scientists. The Arctic Climate Impact Assessment, a comprehensive and independently reviewed study involving more than 300 scientists over a three-year period, projects the near-complete loss of Arctic summer sea ice by the year 2100, if not sooner. ACIA models show significant development of new ice-free areas around the entire Arctic basin, particularly in the late summer months. As soon as by 2020, most coastal waters of the Eurasian Arctic are projected to become more or less ice-free in the month of September.[47]

The retreat of the Arctic sea ice has been documented in a number of studies. The red line in Figure 3.1 indicates the median minimum extent of the Arctic ice cover for the period 1982–2008. In this period, the minimum extent of the ice cover shrunk from 7.5 million square kilometers in 1982 via 5.6 million square kilometers in 2005 to 4.3 million square kilometers in 2007. The retreat of the ice cover was particularly evident along the coast of the Eurasian continent. As for the land-fast ice, observed in places such as in the Svalbard fiords, the long term trend seems to be that it gets thinner, less extensive, and has a shorter life span.[48]

[45] *Climate Change 2007: Synthesis Report*, http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf, p. 72.
[46] *Arctic Climate Impact Assessment*: *Executive Summary* (2005), http://amap.no/acia/, p. 14
[47] *Arctic Climate Impact Assessment: Final Report* (2005) http://amap.no/acia/, p. 1008.
[48] *Global Outlook for Ice and Snow,* http://www.unep.org/geo/geo_ice/PDF/full_report_LowRes.pdf, p. 68f.

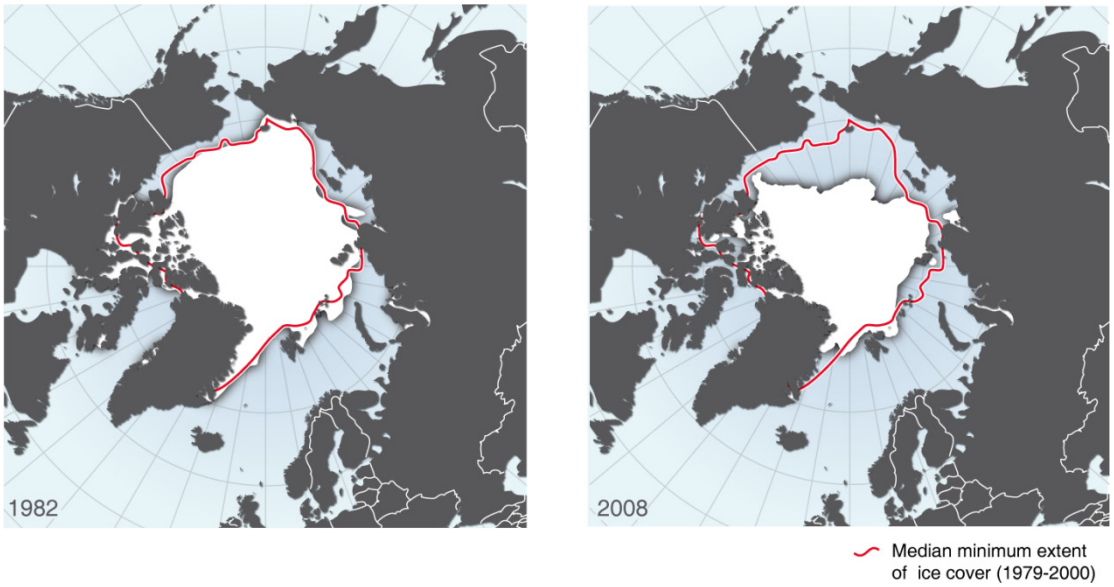

Figure 3.1: Changes in the Arctic ice cover 1982-2008.[49]

Research undertaken in recent years (2006-2009) suggests that summer disappearance of the Arctic ice cap may occur even sooner than previously estimated. One study, published in the December 2006 issue of *Geophysical Research Letters*, indicate that if the emissions of greenhouse gases continue at the current pace, most of the Arctic basin will be ice-free in September by 2040. By this time, the average thickness of the winter ice cover is estimated to have shrunk from 3.5 meters to less than one meter.[50] These findings are generally in line with findings made in other studies, which draw attention to the fact that the Arctic winter ice cover increasingly consists of first-year, rather than multi-year ice. Data from NASA's Ice, Cloud, and Land Elevation Satellite (ICES) and similar sources have contributed to our understanding of the ongoing changes in the thickness and extent of the Arctic sea ice.[51]

As illustrated in Figure 3.2, the Arctic Climate Impact Assessment concludes that the warming trend in the Arctic will continue throughout the 21st century, and that the *winter* ice cover will gradually move away from most Arctic coasts, with the possible exceptions of northern Greenland and northern Ellesmere Island. The loss of sea ice during *summer* is, as mentioned above, projected to be considerably greater than the annual average decrease, leading to a complete or near-complete summer disappearance of the ice cover towards the end of the century, if not sooner.[52] Since its publication in 2005, the ACIA scientific report has been supplemented by other studies, such as NOAA's *State of the Arctic Report* (2006),[53] and WWF's *Arctic Climate*

[49] Map courtesy of Hugo Ahlenius, UNEP/GRID Arendal, http://maps.grida.no/go/graphic/arctic-sea-ice-minimum-extent-in-september-1982-and-2008.
[50] Marika M. Holland, Cecilia M. Bitz & Bruno Tremblay: "Future abrupt reductions in the summer Arctic sea ice", Geophysical Research Letters, Vol. 33 (2006), No. 23, p. 3 (Figure 2a).
[51] See for instance "Researchers Say Arctic Sea ice Still at Risk Despite Cold Winter", posted 18 March 2008 at http://www.nasa.gov/topics/earth/features/seaice_conditions_feature.html.
[52] *Arctic Climate Impact Assessment: Final Report* (2005) http://amap.no/acia/, p. 999.
[53] U.S. National Oceanic and Atmospheric Administration: *State of the Arctic*, 2006, http://www.pmel.noaa.gov/pubs/PDF/rich2952/rich2952.pdf.

Science – an update since ACIA (2008).[54] These reports confirm many of the findings made in previous IPCC and ACIA studies, but argue that the IPCC's and ACIA's scenarios may have been too conservative, and that further studies are needed.

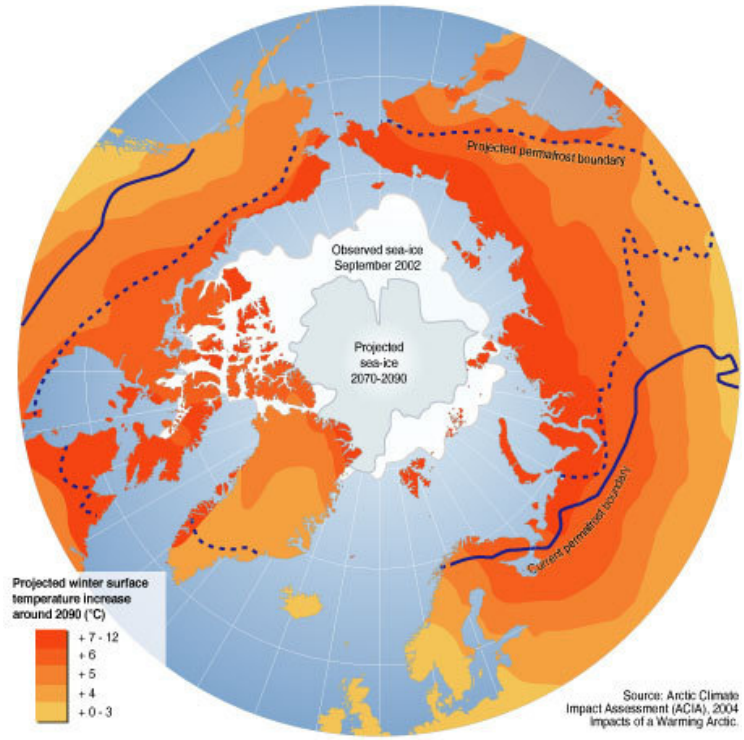

Figure 3.2: Projected winter surface temperature increases and sea-ice extent around 2090.[55]

3.2 Sea Level Rise

Sea-level rise is expected to vary around the globe. As pointed out in the 2005 ACIA report, the largest increases are projected to occur in the Arctic, due to the projected increase in freshwater input into the Arctic Ocean and the resulting decrease in salinity and thus density.[56] By the year 2100, sea levels could be between 0.18 and 0.59 meter above current levels, according to IPCC models.[57] With its volume of approximately 3 million cubic kilometers, the Greenland ice sheet has the potential to contribute tremendously to global sea level rise throughout and beyond the 21st century. Should the entire Greenland ice sheet disappear (unlikely to happen in this century), global sea levels would, according to the IPCC, rise by more than 7 meters, and the deglaciation could be irreversible.[58] This could have a devastating effect on coastal regions within as well as outside the region. In addition to contributing to global sea-level rise, the melting of the Greenland ice sheet adds freshwater to the ocean, with potential impacts on the fresh water/salt water balance of the Arctic Ocean and the Barents Sea, and the pattern of ocean currents.

[54] World Wildlife Fund: *Arctic Climate Impact Science – An Update Since ACIA*, 2008, http://www.worldwildlife.org/climate/WWFBinaryitem8706.pdf.
[55] Map courtesy of Hugo Ahlenius, UNEP/GRID Arendal, http://www.grida.no/polar/ipy/2841.aspx.
[56] *Arctic Climate Impact Assessment: Final Report* (2005) http://amap.no/acia/, p. 999.
[57] IPCC: *Climate Change 2007: Synthesis Report*, http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf, Table 3.1, p. 65.
[58] Ibid., p. 65.

3.3 Change in Ocean Currents

Changes in ocean circulation patterns caused by increasing freshwater input may potentially have several important effects on the Arctic region, particularly in the event of a marked slowing down or abrupt alteration of the Atlantic Meridional Overturning Circulation (MOC).[59] This is the system by which warm waters from the southern hemisphere move northward towards the Arctic Ocean, become cooler and denser, and sink deep into the ocean (see Figure 3.3). The sinking of dense seawater, which typically takes place in the North Atlantic, and in the Labrador Sea, pulls more warm water northward in a "conveyor belt" pattern. The MOC keeps Northern Europe, and particularly the coastal regions, significantly warmer than other high-latitude regions. This delicate system of ocean circulation, driven primarily by differences in heat and salt content, is considered highly vulnerable to increases in the input of fresh water from melting glaciers, the Greenland ice sheet, and changes in precipitation. There are, however, many uncertainties associated with the effects of the latter on the former, due to the large natural variability of ocean currents. Based on model simulations, the IPCC's *Forth Assessment Report* concludes that a "large abrupt transition" of the Atlantic MOC is "highly unlikely" to happen in the course of the 21st century. Yet, it maintains that a "slowing down" of the Atlantic MOC is "highly likely" within the same time frame and that this process is "likely" to include "changes in marine ecosystem productivity, fisheries, ocean co^2 uptake, oceanic oxygen concentrations and terrestrial vegetation".[60]

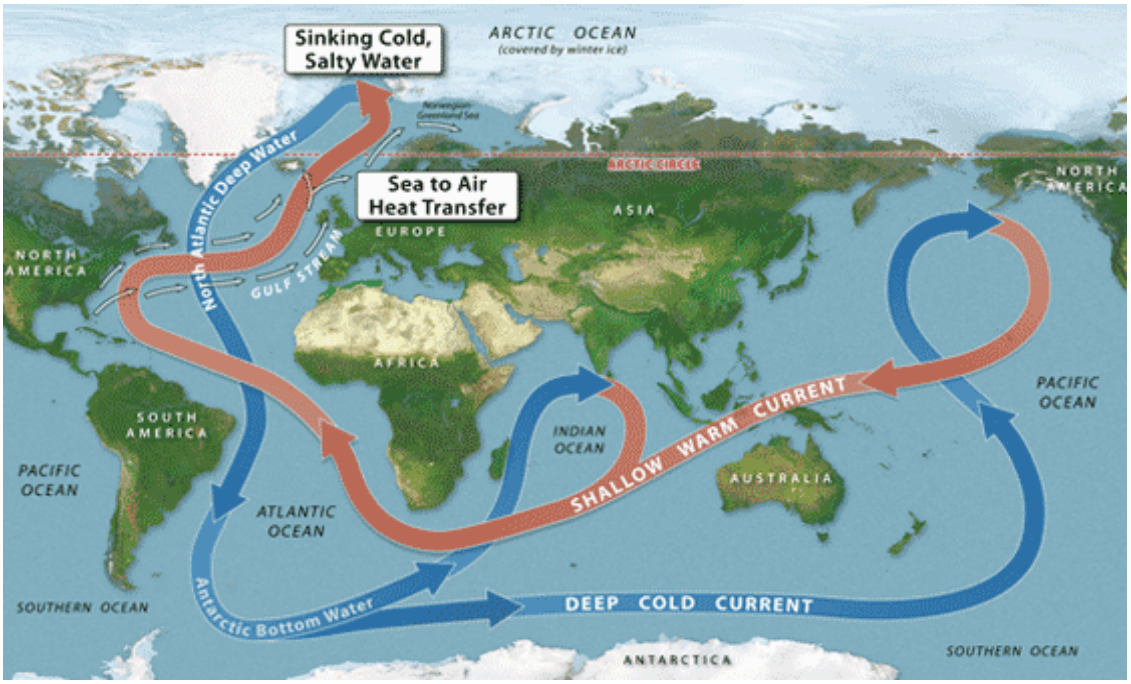

Figure 3.3: The Meridional Overturning Circulation.[61]

[59] IPCC: *Climate Change 2007: Synthesis Report*, http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf, p. 54; *Arctic Climate Impact Assessment: Final Report* (2005), http://amap.no/acia/, p. 1018.
[60] *Climate Change 2007: Synthesis Report*, http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf, p. 54.
[61] Source: http://forces.si.edu/arctic/images/02_02_04_a.gif.

3.4 Permafrost Thaw and Coastal Erosion

Other important aspects of the process of climate change in the Arctic are the thawing of the permafrost and the increase in coastal erosion. The southern limit of the permafrost is projected to shift northward by several hundred kilometers during this century, and the depth of the layer that thaws is increasing each year in many areas, perhaps most notably in Siberia, Alaska, and the Canadian Arctic. Permafrost thawing is already causing serious damage to roads, airfields, buildings, and industrial facilities in Siberia. It is also affecting the livelihoods of northern indigenous peoples, for instance by causing changes in reindeer migration routes.

In some parts of the Arctic, climate change is projected to lead to increasing precipitation and storm frequency. This may in turn increase coastal erosion and increase the possibility of river floods, particularly in spring time, and more frequent and severe land and rock slides.[62] In western Alaska (Newtok) and the western part of the Canadian Arctic (Tuktoyatuk Island), Inuit villages have already begun to slide into the ocean, as warming ocean waters appear to undercut the permafrost base of the cliffs that they in previous times stood solidly on. This development is projected to continue, and possibly accelerate.

As air, water, and soil temperatures in the northern hemisphere increase and the permafrost layer thaws, large amounts of carbon accumulate, currently stored as organic material in the vast peat bogs of Siberia and North America, may be released into the atmosphere. There is significant concern among scholars that methane and carbon dioxide releases from the Arctic tundra may create, or already have created, an "amplifying feedback loop". Releases of greenhouse gases from Arctic soils and sediments may speed up the process of global warming, which in turn would cause additional releases, and so on. However, as pointed out in the ACIA, the potential magnitude of these releases is "subject to substantial uncertainties".[63]

3.5 A More Accessible Arctic?

Most scientific studies dealing with the topic of climate change in the Arctic, including the Arctic Council's *Arctic Climate Impact Assessment* and the IPCC's *Fourth Assessment Report*, conclude that the land and maritime areas of the Arctic will become more accessible in the 21st century than they were in the 20th. Even with reductions in greenhouse gas emissions, air and sea temperatures in the region will continue to increase, glacial ice will continue to melt, and the Arctic ice cover will continue to retreat, possibly leading to a total loss of summer sea ice sometime in the second half of the century, if not sooner. The "direct" effects of climate change on the physical environment of the region, and on the planet as a whole, belong to the category of "environmental" security concerns. Processes in the lower atmosphere interact with processes in the ocean, and the nature of this interaction can have severe consequences for biodiversity and living conditions in the northern hemisphere.

[62] *Arctic Climate Impact Assessment: Final Report* (2005) http://amap.no/acia/, p. 917,
[63] *Impacts of a Warming Arctic: ACIA Overview Report* (2004), http://amap.no/acia/, p. 38.

In the coming decades, the Arctic is likely to become an increasingly important arena for regional and intercontinental marine transportation, and natural resources located in the vast land areas north of the Arctic Circle (oil, gas, minerals, timber, etc.) may become more accessible than they are today. The same goes for petroleum resources located on the continental shelf.[64] Innovations on subsea technology may lead to the exploration and exploitation of previously inaccessible oil and gas deposits on the wide and relatively shallow continental shelf that surrounds the Arctic Ocean (e.g., in the Barents, Pechora, and Kara Seas, and off the coasts of Siberia and Greenland).

The picture of an increasingly accessible Arctic is, however, far from unambiguous. As noted above, there are also developments that threaten to make the region *less* accessible. Permafrost thawing, for instance, represents a formidable challenge to traditional as well as modern human activities. It changes the ecology in regions populated by subsistence communities and may force them to give up traditional livelihoods or move to other places. It also causes damage to northern housing, industrial facilities, and transport infrastructure such as ports, airports, roads, railroads, and pipelines. And at sea, ice conditions may become more unpredictable than they have been in the past, despite the overall shrinkage in the extent of the Arctic ice cover. The tendency towards more frequent and severe storms may also become an annoyance to northern communities, seafarers (merchant and naval), and industrial enterprises conducting operations in the Arctic.

Overall, there are also many uncertainties when it comes to the interplay between various elements of the global climate system. For instance, a slowing down of the Atlantic Meridional Overturning Circulation (MOC) may have a "cooling" effect on (European) parts of the northern hemisphere, but this effect will probably not be sufficient to compensate for the "warming" effect of increasing, or continued high, greenhouse gas emissions.[65] Continued increases in Arctic air and water temperatures, which is the most likely scenario, may eventually bring the system to a "tipping point", characterized by the onset of rapid, unpredictable, and irreversible changes. The *tempo* with which such changes occur may be no less important than their *scope*. Imagine for instance a rapid meltdown of the Greenland ice sheet, and a simultaneous 7.3 meter increase in the sea level. It would be utterly difficult for most societies to adapt to such a dramatic turn of events if it took place in the course of a few years, rather than decades or centuries.

Natural variability in temperatures, ocean currents, and sea ice extent in the Arctic makes it inherently difficult to determine what constitutes the ultimate "tipping point", and when it is reached. For instance, the record-breaking Arctic sea ice extent recorded in September 2007 – the lowest summer minimum level registered since satellite measurements began in 1979 – lead some scientists to start speculating whether the tipping point had already been reached.[66] Evidence of this is still inconclusive. But there is little doubt that global climate change is affecting and will continue to affect the Arctic region in a number of ways.

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[64] *Impacts of a Warming Arctic: ACIA Overview Report* (2004), http://amap.no/acia/, p. 82f.
[65] *Climate Change 2007: Synthesis Report*, http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf, p. 54.
[66] See for instance Richard A. Kerr: "Is Battered Arctic Sea Ice Down for the Count?" *Science*, Vol. 318, No. 5847, 5 October 2007, pp. 33–34.

4 The Conflict Potential in the Arctic

In addition to its *direct* effects on the physical environment of the Arctic, discussed in the previous chapter, climate change can, as noted in the introductory chapter, also affect the region in a number of *indirect* ways. As noted in the introduction, it can serve as a "threat multiplier" and potentially aggravate disputes and conflicts within and between states. Throughout the 21st century, changes such as the ones outlined above may lead to alterations in the scope and level of human activity in the Arctic, or at least parts of the Arctic, with potential implications for the relationship between various state and non-state stakeholders in the region. Even in the medium term – let's say, the period up to 2030 – governments as well as international and regional organizations involved in Arctic affairs may have to deal with a wide range of security concerns, traditional as well as non-traditional. Many of the emerging security concerns are linked to activities such as oil and gas extraction, fisheries, and marine transportation, all of which can be facilitated by the dynamics of climate change. Contrary to the situation during the Cold War, the conflict lines of the 21st century Arctic will not necessarily follow traditional alliance patterns ("NATO vs. Russia"), let alone land, sea, and shelf borders between states. We may well see a simultaneous occurrence of intra- and inter-state disputes. These may vary in severity, intensity, and duration. Their containment may require not only the presence of military capabilities, but also robust international regimes and institutional arrangements.

4.1 Conflicts between Interest Groups and Sectors

As pointed out by Gail Osherenko and Oran Young in their book *The Age of the Arctic*,

> [t]he landscape of Arctic conflict […] constitutes a complex mosaic rather than a unidimensional pattern featuring a single dominant cleavage or axis of conflict. The interest groups holding significant stakes in the region do not line up on the same side of each and every issue. Rather, Arctic conflicts form a pattern that political analysts describe in terms of the concept of cross-cutting cleavages.[67]

The term 'cross-cutting cleavages' refers to a situation in which (here: sub-state) actors and interest groups have converging interests on some issues, and diverging interests on others. Local communities and native groups in the Arctic may for example find it to be in their interest to ally with the oil industry and lobby for projects that can create new jobs and income opportunities. On other occasions, local actors may be inclined to oppose industrial projects and more likely to join forces with environmentalists in the protection of ecosystems. Thus, "[i]n the Arctic, your opponent today may well turn out to be your ally tomorrow".[68]

The presence of cross-cutting cleavages is generally believed to have a stabilizing effect on political communities. The lack of a clearly defined "front line" along which all or most members of society can line up, and the recognition that sub-state actor relations in the Arctic have

[67] Gail Osherenko & Oran R. Young: *The Age of the Arctic: Hot Conflicts and Cold Realities*. Cambridge: Cambridge University Press 2005 [1989], p. 168.
[68] Ibid.

undergone significant changes in the past and probably will continue to so, may serve as an incentive for actors to behave with restraint in region- or period-specific conflict situations. Take for instance the relationship between the Russian military and the petroleum industry in the Barents Sea region, which in the course of the 1990s went from a state of rivalry to a state of pragmatic partnership.[69] Still, there is no denying that some 'cleavages' are deeper than others. The surge in interest shown towards the Arctic as an arena for economic activity may sharpen intra-state conflicts and complicate the relationship between, for example, industrial entrepreneurs, and native groups who perceive their livelihoods to be at stake.

Often, sub-state actors voice their concerns in terms of "security", suggesting that someone or something is "threatened" by an on-going or planned development. The challenge, seen from a political perspective, is that their respective security agendas are not always compatible. The state-centric "hard security" agenda of military establishments, typically focusing on the maintenance of political and military stability in the region, may not necessarily be compatible with the "energy security" agenda of industrial actors, which again may be incompatible with the "environmental security" agenda of environmental NGOs, or the "societal" or "human security" agenda of indigenous or other groups. In the Arctic, as elsewhere, "threats" may emerge not only at the state level, but also at the level of societies and groups. The same goes for the mobilization of various forms of counter-measures against the perceived threats.[70]

Conflicts of interest between various sub-state and non-state actors are likely to arise several places in the Arctic in the coming decades, without necessarily jeopardizing the political stability of individual countries or the region as a whole. Many of the conflicts and disputes will have to be sorted out at the local level, through negotiations, private bargaining, or in court. Others will have to be addressed at the governmental level. Each Arctic state will have to formulate its priorities and find ways to balance its sometimes conflicting economic, environmental, and military security interests in the region. Overarching "Arctic strategies", such as the ones that have been formulated by a number of Arctic states in recent years, can be helpful insofar as they lay down some basic goals and principles for future activities.

The formulation of national priorities, and the settlement of often complex domestic conflicts of interest, can be a demanding exercise, and ideally it should be repeated on a more or less regular basis. The pattern of conflict within one Arctic state may have striking similarities with that of another. Hence, by getting together and sharing their experiences, Arctic states, and for that matter sub-state actors, can have much to learn from each other when it comes to the handling of intrastate conflicts and political controversies related to the region in question. Such exchanges may take place on a bilateral basis as well as in pan-Arctic settings. For instance, the Inuit Circumpolar Council (ICC), representing some 150,000 Inuit from Alaska, Canada, Greenland,

[69] For details, see Kristian Åtland: "Russia's Northern Fleet and the Oil Industry – Rivals or Partners?" *Armed Forces & Society*, Vol. 35, No. 2 (2009), pp. 362–384.

[70] However, within the domain of "hard security", the state level has traditionally been privileged, and this is likely to remain the case. All armed forces operating in the Arctic, including the High Seas, are regular forces controlled by states, particularly states that have prominent strategic and/or economic interests in the region.

and Chukotka (Russia), has proven to be an important instrument in the efforts to raise awareness about climate-related and other security concerns of Arctic indigenous groups.[71]

4.2 Conflicts over Access to Petroleum Resources

In March 2008, the European Union published a report titled *Climate Change and International Security*, which, inter alia, touches on the topic of climate-induced resource conflicts in the Arctic. In the report, the European Commission and its High Representative for Foreign and Security Policy argue that "the increased accessibility of the enormous hydrocarbon resources in the Arctic is changing the geo-strategic dynamics of the region with potential consequences for international stability and European security interests". This development is, in the words of the Commission, "illustrated by the recent planting of the Russian flag under the North Pole". The report calls attention to "the intensified competition over access to, and control over, energy resources", and maintains that "there is an increasing need to address the growing debate over territorial claims [in the Arctic]".[72]

The United States, on its part, has used the potential for resource-related conflicts in the Arctic as an argument in favor of strengthening the US Navy. In the "Cooperative Strategy for 21st Century Seapower", published in October 2007, it is argued that "climate change is gradually opening up the waters of the Arctic, not only to new resource development, but also to new shipping routes that may reshape the global transport system". These developments may offer new opportunities for economic growth, but they are also, in the words of the Strategy, "potential sources of competition and conflict for access and natural resources".[73]

Concerns that rivalry over access to Arctic petroleum resources may lead to increasing interstate tensions are also common in the Russian political discourse. For instance, in July 2007, shortly before the Russian North Pole expedition, the former director of a Moscow-based foreign policy think tank[74], Dr. Vladimir Frolov, published an article in the *Russia Profile* magazine titled "The Coming Conflict in the Arctic". In this article, he argues that "Russia needs to find new sources of fuel" and that "the Arctic seems like the only place to go". The fact that international law does not recognize Russia's right to the entire Arctic seabed north of the Russian coastline is described as a "problem", and the United Nations' non-acceptance of previous Russian claims in the region is largely blamed on United States. The United States is, in Frolov's terminology, "jealous of Russia's attempts to project its dominance in the energy sector", and potentially disposed "to intrude on Russia's home turf".[75]

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[71] Cf. Jessica Shadian: "Remaking Arctic governance: the construction of an Arctic Inuit polity", *Polar Record*, Vol. 42, No. 3 (2006), pp. 249–259.
[72] "Climate Change and International Security", Paper from the High Representative and the European Commission to the European Council, 3 March 2008, http://www.consilium.europa.eu/ueDocs/cms_Data/docs/ pressData/en/reports/99387.pdf, pp. 4 and 6.
[73] United States Navy: "A Cooperative Strategy for 21st Century Seapower", October 2007, http://www.navy.mil/maritime/MaritimeStrategy.pdf, p. 6.
[74] The National Laboratory for Foreign Policy.
[75] Vladimir Frolov: "The Coming Conflict in the Arctic", *Russia Profile*, 10 July 2007, http://www.russiaprofile.org/page.php?pageid=International&articleid=a1184076124.

Statements such as these may indicate that there is a tendency among several of the Arctic states to regard their northern neighbors as potential "rivals" and "competitors" in the quest for oil and gas resources on the Arctic continental shelf. It is also possible that current legal disputes in the region, outlined in Chapter 2.3, may acquire increasing significance in the period up to 2030, possibly leading to an increase in the coastal states' military presence in the region. But to suggest that interstate "resource wars" are looming in the background seems somewhat far-fetched. In all of the states concerned, the use of military force is seen as a last-resort option, and even though the stakes are high, most international powers would prefer to play by the rules of international law, since failure to do so would alienate the sympathy of foreign investors.[76] Also, there seems to be a growing recognition among Arctic states that they are facing a "security dilemma", and that unilateral moves could set off an "arms race" that none of the states want.

As Barry Zellen points out in his latest book, military power will continue to have its place in the region, and to some extent determine the availability of resources. But, in the most likely scenario, "it is science that will define the new boundaries".[77] Uncertainty and disagreements over borders and jurisdiction on the Arctic continental shelf may be gradually replaced by certainty and agreement, as the outer limits of each Arctic state's offshore domain are clarified through undersea mapping, agreed-upon legal procedures, and bilateral negotiations. Some of the disputes may be more difficult to resolve than others, or just take longer time to settle, but there seems to be more patience among the involved stakeholders than is generally recognized. One of the reasons for this is that most of the currently known and, in theory, extractable oil and gas resources on the Arctic shelf are located in *areas of unchallenged national jurisdiction*. Economically as well as politically, it would make little sense for a country that has access to unexploited fields on land or in undisputed waters relatively close to the shore to embark on costly offshore projects in disputed, and possibly ice-infested, waters further from the coast. It should also be pointed out that four of the five Arctic coastal states are UNCLOS signatories, and that all of them seem to take the legal commitments seriously, as stated in the 2008 Ilulissat declaration.[78] The same goes for their collective "stewardship" responsibilities in the region.

However, when discussing the long-term conflict potential in the Arctic, one should also be aware of the potential for disagreements between the "Arctic five" (the Arctic coastal states) and the remaining three members of the Arctic Council (Iceland, Sweden, and Finland), and, perhaps more problematic, between Arctic and non-Arctic states. Should an "outside" actor such as China suddenly establish a significant presence in the region, for commercial, military, or other purposes, this could potentially lead to frictions with the established community of Arctic states.[79] The involvement of third-party actors in the exploration or exploitation of resources in disputed areas could also have a destabilizing effect on interstate relationships.

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[76] Roger Howard: *The Arctic God Rush: The New Race for Tomorrow's Natural Resources*, London: Continuum 2009, p. 19.
[77] Barry Zellen: *Arctic Doom, Arctic Boom: The Geopolitics of Climate Change in the Arctic*, Santa Barbara, CA: Praeger 2009, p. 113.
[78] http://www.oceanlaw.org/downloads/arctic/Ilulissat_Declaration.pdf.
[79] Cf. Roger Howard, op. cit., pp. 21–22.

4.3 Conflicts over Access to Marine Resources

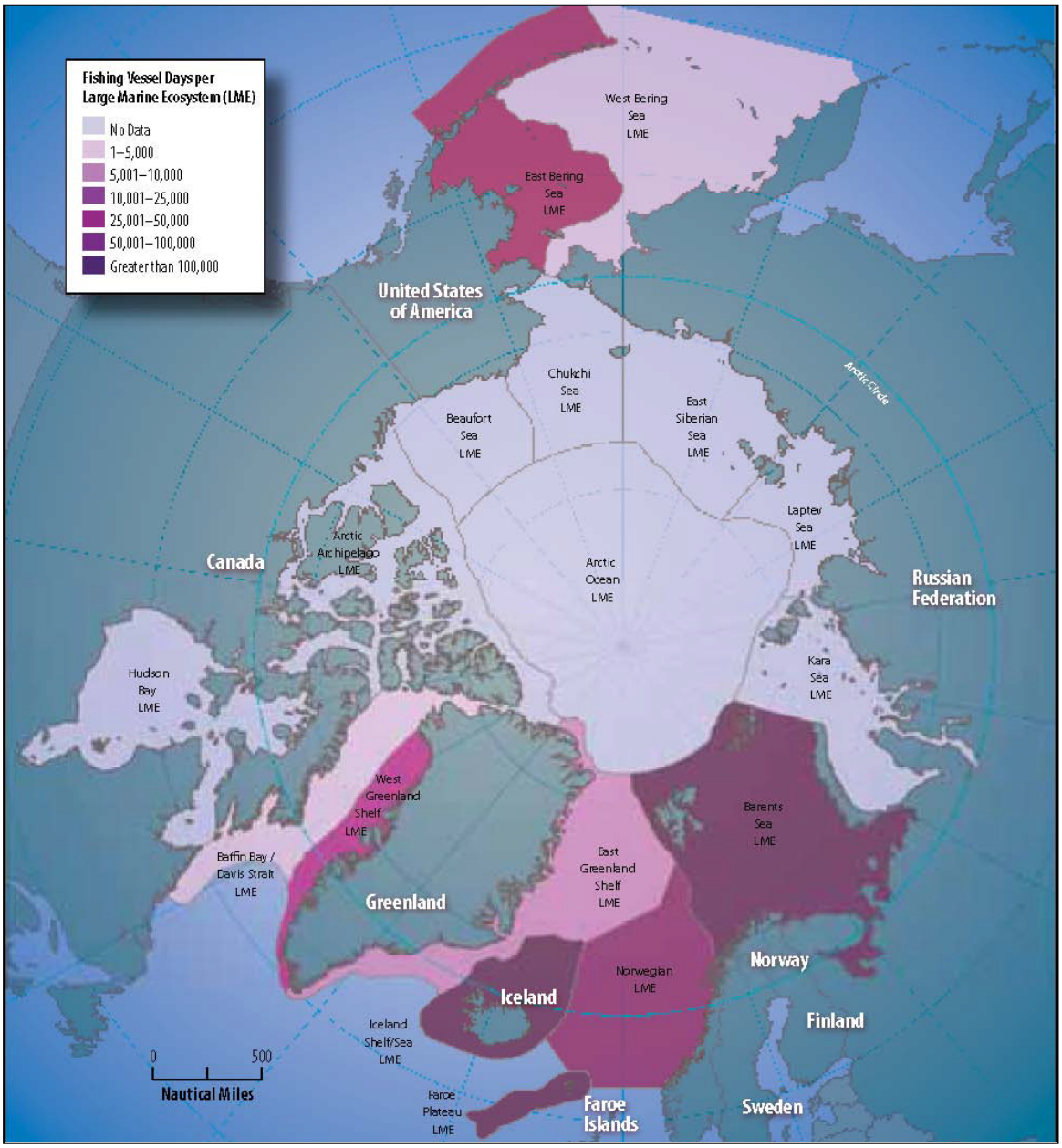

Figure 4.1: Current fishing vessel activity in the Arctic.[80]

The Arctic seas contain some of the world's oldest and richest commercial fishing grounds, and fisheries constitute an important part of the economies of many, if not all, Arctic states. As documented in the Arctic Council's *Arctic Marine Shipping Assessment 2009 Report,* fisheries are particularly extensive in the Norwegian and Barents Seas, and the eastern part of the Bering Sea (see Figure 4.1).

[80] Arctic Council: *Arctic Marine Shipping Assessment 2009 Report*, http://pame.arcticportal.org/images/stories/PDF_Files/AMSA_2009_Report_2nd_print.pdf, p. 77.

The long-term impact of climate change on fish stocks in these and other waters adjacent to the Arctic Ocean is hard to predict, but the most likely scenario is that the stocks will gradually move northwards as sea temperatures heat up. A study conducted by the US Arctic Research Commission in 2002 concluded that "climate change is likely to bring extensive fishing activity to the Arctic, particularly in the Barents Sea and Beaufort-Chukchi region[...]", and that "Bering Sea fishery opportunities will increase as sea ice cover begins later and ends sooner in the year".[81]

A relevant question in this regard is whether and how the northwards movement of fish stocks, possibly accompanied by a decline in stocks further south, will impact on interstate relations in the region, and the relationship between Arctic and non-Arctic states. Fishery disputes may arise not only between neighboring coastal states, such as Norway and Russia in the Barents Sea (including the Svalbard Zone), but also when coast guard vessels act to protect the region's marine resources from extensive harvesting by boats from distant regions. Tensions may also arise when stocks migrate from the waters of one country into those of another, cf. the migration of Alaska snow crabs from traditional locations off the coast of Alaska towards Russia's northeastern coastline. A third category of challenges relates to the northward movement of fish stocks into areas of the High Seas that are unregulated by fishing quotas.[82]

Historically, interstate disputes over access to marine resources in contested areas of the ocean are not a new phenomenon. Frequently cited examples of so-called "fish wars" are the British-Icelandic "cod wars" in the North Atlantic (1958-61, 1973-73, and 1975-76), the Norwegian-Icelandic dispute over fisheries in the Svalbard Fisheries Protection Zone (1994), and the Canadian-Spanish/EU "turbot war" on the Grand Banks off Newfoundland (1995). In the North Pacific, Russia and Japan have had a long-standing dispute over fishing rights in the waters around the disputed Kurile Islands, occasionally leading to the use of military force.[83] All of the clashes listed above included various forms of "extraordinary" measures being undertaken in the name of a state against one or more fishing vessels of another state. The list of measures that were taken includes the firing of warning shots, trawls cuttings, seizure of ships and/or crews, deliberate rammings, and live fire aimed at the hull of fishing vessels.

It should be noted, however, that fishery-related disputes rarely escalate to the level of sinking of ships and loss of life. Statistically, the use of military force in fishery disputes is rare, and when force is used, it is rarely reciprocated. In other words: Interstate fishery disputes rarely get "militarized", in the sense of leading to the exchange of fire between naval forces, and it can therefore be claimed that they in most cases do not "carry the implications of war".[84] This is not to say that there is no potential for escalation of such disputes. Despite the progress that has been

[81] "The Arctic Ocean and Climate Change: A Scenario for the US Navy", *United States Arctic Research Commission Publications*, No. 02-1, 2002, cited in Howard, op. cit., p. 97.
[82] Roger Howard, op. cit., p. 97.
[83] In 2006, a Japanese fisherman was shot and killed when a Russian patrol boat opened fire on a Japanese fishing schooner near Kaigara Island of the Southern Kuriles. See "Japanese Fisherman Killed in Kuriles Incident", *Radio Free Europe/Radio Liberty Newsline*, 16 August 2006.
[84] Jessica Weeks & Dara Kay Cohen: "Red Herrings: Fishing Disputes, Regime Type, and Interstate Conflict", Paper presented at the Stanford International Relations Workshop, 7 March 2006, p. 7.

made in recent years in the efforts to address collective marine management challenges in the Arctic, such as previously extensive illegal, unreported, and unregulated (IUU) fishing in the Barents Sea, all Arctic states want to secure their "slice of the pie". Regulatory measures undertaken by one state, particularly in areas of unclear or disputed jurisdiction, may be interpreted by another state as biased and unjustified, rather than as being motivated by objective management needs, and this may be a potential source of conflicts.

If a fishing vessel – with or without the backing of its flag state – refuses to abide by instructions given by the official forces[85] of a coastal state and tries to escape punishment by fleeing, the coastal state may decide to resort to the use of force to immobilize it. The coastal state may under certain circumstances also extend its jurisdiction onto the high seas to seize the vessel. The coastal state's right of "hot pursuit",[86] which is elaborated on in the 1982 UN Convention of the Law of the Sea (article 111) as well the 1958 High Seas Convention (article 23), ceases only when the ship pursued has entered the territorial waters of its own or a third state. If the flag state of the fishing vessel in question does not recognize the coastal state's right of hot pursuit, it may attempt to convince (or deter) it to abort the pursuit – by diplomatic means, or by the threat, display, or use of military force against the pursuers.

An interesting case in this regard was the so-called *Elekton* incident in October 2005, which started when a Norwegian Coast Guard vessel attempted to arrest a Russian trawler in the Svalbard Fisheries Protection Zone.[87] The trawler refused to follow instructions given by the Norwegians, and suddenly took off from its pursuers, with two Coast Guard inspectors still on board. This lead to a three-day chase through the Barents Sea, involving four Norwegian Coast Guard vessels, two helicopters, and a maritime patrol aircraft. The pursuit continued through the Barents Sea "Loophole"[88] and into the Russian Exclusive Economic Zone, and was not aborted until the vessel crossed into Russian territorial waters.

Contrary to what many expected at the outset of the pursuit, the *Elektron* incident did not escalate to become a militarized interstate dispute between Norway and Russia. Instead, it was handled in a non-confrontational manner by diplomats, and later, the judicial system. Both parties exercised restraint with regard to the use of force. Because of the weather conditions at the time of the pursuit, with stormy weather and 30-foot waves, the Norwegian Coast Guard did not want to jeopardize the safety of the trawler and its crew by using excessive force to stop it. And despite numerous calls for a heavy-handed Russian response, particularly from the Murmansk-based Fishing Industry Union of the North, the Russian Navy did not get involved in the dispute. It did, however, dispatch a destroyer to the territorial line, where the "kidnapped" Norwegian officers were allowed to disembark the trawler. The Russian destroyer then escorted the trawler and its

[85] Typically Coast Guard or Navy vessels, maritime patrol aircraft, or helicopters.
[86] See Nicholas M. Poulantzas: *The Right of Hot Pursuit in International Law*, The Hague: M. Nijhoff 2002; Malcolm N. Shaw: *International Law*, Cambridge: Cambridge University Press 1997, pp. 424–425.
[87] For a detailed discussion, see Kristian Åtland & Kristin Ven Bruusgaard: "When Security Speech Acts Misfire: Russia and the *Elektron* Incident", *Security Dialogue*, Vol. 40, No. 3 (2009), pp. 333–353.
[88] The "Loophole" is a pocket of international waters in the central part of Barents Sea, surrounded by the Exclusive Economic Zones of Norway and Russia, and the Svalbard Fisheries Protection Zone.

captain back to Murmansk for subsequent criminal proceedings. The Russian newspaper *Gazeta* could report that "the war with Norway has been called off".[89]

Incidents such as the one described above, where diverging views on the legal status of a recourse-rich maritime area lead to potentially dangerous confrontations at sea, are likely to happen again. The handling of the *Elektron* incident gives cause for a certain degree of optimism when it comes to the prospects for non-violent solutions of such disputes, but there is no guarantee that the incidents of the future will be handled in the same manner.

The pressure against the renewable marine resources of the Arctic is likely to increase, partly as the result of global climate changes and resource scarcities in other parts of the world. This may lead to frictions not only between neighboring coastal states, but also between regional and outside actors. As water temperatures rise and the ice edge moves further and further north, the feeding areas of commercially important fish stocks are likely to follow suit, and so are the fishing fleets of Arctic as well as non-Arctic states. This will place heavy demands on the coastal states' ability to regulate the harvesting, hinder illegal, unreported, and unregulated fishing, and prevent the escalation of interstate disputes.

4.4 Conflicts over Access to Shipping Lanes

As mentioned in Chapter 2.3, there are also a number of lingering disagreements between at least some Arctic states when it comes to the legal status of the two main maritime transport corridors through the Arctic – the Northwest Passage (north of Canada) and the Northern Sea Route (north of Russia). The disagreements relate to issues such as the drawing of baselines, the outer borders of internal waters, the status of straits, and the right of innocent passage.

According to the Arctic Council's 2009 *Arctic Marine Shipping Assessment*, some 6000 vessels of various categories visit the Arctic marine area annually.[90] All but a few voyages (such as icebreaker cruises to the North Pole) take place on the periphery of the Arctic Ocean, where ice conditions are the most accommodating. Traffic is particularly extensive along the Norwegian west coast and in the Barents Sea. There is also considerable ship traffic in the waters around Iceland and the Faroe Islands, southwest of Greenland, and in the Bering Sea. This traffic is a mix of fishing, domestic cargo and cruise ships. Cargo vessels also regularly travel along the North Pacific Great Circle Route between Asia and North America, through the Aleutian Islands.[91] In the Barents Sea, much of the traffic goes to and from the port of Murmansk. In addition to naval vessels, ships travelling the Barents and Norwegian Seas include oil and LNG tankers, bulk cargo carriers, coastal ferries, fishing vessels, cruise ships, research vessels, and so on. There is also a sizeable year-round traffic of ice-enforced tankers and bulk carriers along the western part of the

[89] Yaroslav Zorin & Evgeniy Smirnov: "Voina s Norvegiei otkladyvaetsya" [The war with Norway has been called off], *Gazeta*, 20 October 2005.
[90] Arctic Council: *Arctic Marine Shipping Assessment 2009 Report*, http://pame.arcticportal.org/images/stories/PDF_Files/AMSA_2009_Report_2nd_print.pdf, p. 72.
[91] Arctic Council: *Arctic Marine Shipping Assessment 2009 Report*, http://pame.arcticportal.org/images/stories/PDF_Files/AMSA_2009_Report_2nd_print.pdf, p. 73f.

Northern Sea Route, between Murmansk and Varandey on the Pechora Sea (petroleum shipments from Western Siberia)[92], and between Murmansk and Dudinka in Siberia (nickel and copper shipments from Noril'sk).

Despite significant reductions in the sea ice extent in recent decades, traffic volumes along these routes are still fairly modest, and the traffic is mostly *destinational* (re-supply of local communities, transportation of natural resources out of the region, and cruise traffic), rather than *trans-Arctic*.[93] According to the *Arctic Marine Shipping Assessment*, this is likely to remain the situation in the foreseeable future. But it is also possible to imagine scenarios under which trans-Arctic shipping becomes more attractive. In the coming decades, the sailing routes in question are likely to become ice-free for considerable parts of the year, particularly north of Siberia and the Russian Far East. This may, at least in theory, lead to an increase in traffic volumes, particularly in the event of a destabilization of regions surrounding other strategic transit points such as the Suez and Panama Canals. Temporary or permanent increases in ship traffic in the Arctic may potentially heighten the risk of interstate conflicts related to the use of major Arctic marine transport routes, regional as well as intercontinental.

Figure 4.2: The Northwest Passage

Figure 4.3: The Northern Sea Route

The Northwest Passage goes along the northern coast of North America (see Figure 4.2), through the waters of the Canadian Arctic archipelago, around which Canada in 1985 drew straight baselines and simultaneously declared to be "internal waters".[94] This view is not shared by the United States, which considers the passages in question to be "international straits" and subject to

[92] The Varandey terminal has shipped out total of 19 million tons of crude oil since the start-up in 2008, see http://www.barentsobserver.com/10-million-tons-shipped-from-varandey-oil-terminal.4725304-16334.html.

[93] Arctic Council: *Arctic Marine Shipping Assessment Report 2009*, http://web.arcticportal.org/uploads/4v/cb/4vcbFSnnKFT8AB5lXZ9_TQ/AMSA2009Report.pdf, pp. 4–5.

[94] Cf. Donald R. Rothwell: "The Canadian-U.S. Northwest Passage Dispute: A Reassessment", *Cornell International Law Journal*, Vol. 26, No. 2 (1993), pp. 331–332; and Rob Huebert: "Polar vision or tunnel vision: The making of Canadian Arctic policy", *Marine Policy*, Vol. 19, No. 4 (1995), pp. 343–344.

the freedom of navigation, for commercial as well as state vessels. The European Union seems to take a similar view. While not explicitly addressing the status of the waters of the Northwest Passage, the 1988 Arctic Cooperation Agreement between Canada and the U.S. stated that navigation by U.S. icebreakers in the waters claimed internal by Canada would take place with Canadian consent. As pointed out by Jessie Carman,[95] this agreement temporarily stabilized the situation, but applied only to *icebreakers*, assuming that any commercial vessel operating in these waters would require icebreaker assistance. This assumption may not necessarily be true in the future. Climate change may at some point turn the Northwest Passage into a commercially viable route for non-supported transits, seasonal or year-round, and this may potentially lead to heightened tensions between Canada and the U.S., and/or between Canada and the EU. An additional source of concern for the Canadians is the allegations that U.S. nuclear submarines may have transited unannounced through Canadian Arctic waters. Such rumors circulated in 2005, and provoked strong reactions in Canada.[96] In recent years, Canada has taken steps to strengthen its military presence in the region, and in December 2009, the Canadian parliament voted almost unanimously in favor of a bid to rename the country's Arctic seaway "the *Canadian* Northwest Passage".[97]

On the other side of the Arctic, Russia's position is not very different from that of Canada. Russia has drawn straight baselines around Novaya Zemlya, Severnaya Zemlya, and the East Siberian Islands, rendering the waters between the Russian mainland and said islands to be internal waters.[98] In fact, the entire "sector" between the Russian coastline and the North Pole is frequently described as Russian. Russian and Soviet legal experts have long claimed that the straits along the Northern Sea Route (see Figure 4.3) "cannot be regarded as being used for international navigation, since the entire history of Arctic exploitation knows only extremely rare individual instances of passage through them by non-Russian ships".[99] The straits that connect the Barents, Kara, Laptev, and East Siberian Seas are, in other words, seen as part of "a special legal regime [that precludes] their uncontrolled used by foreign seafarers".[100] Other countries, most notably the United States, have questioned the Russian position and claim that the straits are "international", and that the right of innocent passage for foreign vessels exists.

The Northern Sea Route, first established in the 1930s, was formally opened to international ship traffic in July 1991, almost four years after Mikhail Gorbachev's 1987 "Murmansk Initiative", in which the Soviet leader took issue with security-related and other arguments against such a

[95] Jessie C. Carman: "Economic and Strategic Implications of Ice-Free Arctic Seas", in Sam J. Tangredi (ed.): *Globalization and Maritime Power*, Washington, D.C.: National Defense University Press 2002, p. 171f.
[96] Chris Wattie: "U.S. Sub May Have Toured Canadian Arctic Zone", *National Post*, 19 December 2005, p. A1.
[97] Randy Boswell: "Arctic sea route to be renamed 'Canadian Northwest Passage'", *The Vancouver Sun*, 3 December 2009 (Italics added).
[98] R. Douglas Brubaker: "The Legal Status of the Russian Baselines in the Arctic", *Ocean Development & International Law*, Vol. 30, No. 3 (1999), p. 207.
[99] A. L. Kolodkin & M. E. Volosov: "The legal regime of the Soviet Arctic", *Marine Policy*, Vol. 14, No. 2 (1990), p. 163.
[100] Ibid.

development.[101] In terms of distance, the Route offers significant savings compared to alternative routes between ports in Northwest Europe (e.g., Hamburg) and Northeast Asia/Northwest America (e.g., Yokohama, Hong Kong, Singapore, and Vancouver). For some destinations (see Table 4.1) distance savings can be as high as 50%. Distance savings would be even greater for traffic between high-latitude ports in Northern Europe (e.g., Northern Norway and the Kola Peninsula) and the Northern Pacific area (e.g., Alaska). For international shipping companies, savings in distance may lead to savings in time and money, and some analysts have estimated the savings could be as much as $800,000 in fuel and labor per trip for a large freighter.[102]

	From Hamburg to:			
Shipping routes via:	Vancouver	Yokohama	Hong Kong	Singapore
Northern Sea Route	6635	6920	8370	9730
Suez Canal	15377	11073	9360	8377
Cape of Good Hope	18846	14542	13109	11846
Panama Canal	8741	12420	12920	15208

Table 4.1: Alternative shipping routes to ports in the Pacific and Atlantic, in nautical miles.[103]

Still, as of today, there is considerable reluctance among foreign as well as Russian shipping companies to make use of Russia's northern waterway, particularly as an intercontinental route. As a rare exception, two German cargo ships from the Bremen-based Beluga Group, assisted by a Russian icebreaker, conducted a successful journey along the entire length of the Northern Sea Route in the summer of 2009.[104] The journey went from east to west, and the vessels encountered very little ice throughout the transit. However, neither this nor other shipping companies have plans to start regular or year-round trans-Arctic operations. There is still too much uncertainty, which relates to factors such as the generally unpredictable ice conditions, the lack of infrastructure, lacking availability of search and rescue services, inter-state disagreements over the legal status of the waters and straits along the Route, insurance-related issues, and the terms and fees set by the Russian Northern Sea Route Administration.

In a more distant future, intercontinental transits along routes further from the coastline – north of the Russian islands and north of the Canadian archipelago – could become a reality. Such a turn of events could create a variety of new legal and safety concerns, very different from those that are associated with the current sailing routes. It could deprive Arctic coastal states such as Russia and Canada of much of its prestige and regulatory power, not to mention potential sources of income.

[101] Kristian Åtland: "Mikhail Gorbachev, the Murmansk Initiative, and the Desecuritization of Interstate Relations in the Arctic", *Cooperation and Conflict*, Vol. 43, No. 3 (2008), pp. 304–305.
[102] Anthony L. Russell: "Carpe Diem: Seizing Strategic Opportunity in the Arctic", *Joint Force Quarterly*, Vol. 51, 4th quarter 2008, p. 96.
[103] Claes Lykke Ragner: *Northern Sea Route Cargo Flows and Infrastructure: Present State and Future Potential*, FNI Report 13/2000, p. 1.
[104] See "First through Northeast Passage", *BarentsObserver*, 9 September 2009, http://www.barentsobserver.com/first-through-northeast-passage.4629485-16175.html.

4.5 Traditional Military Conflicts

Since the end of the Cold War, the potential for "traditional" military conflicts in the Arctic has been reduced, but not eliminated. The region is still seen, particularly in Washington and Moscow, as a potentially important arena for ballistic missile nuclear submarine (SSBN) operations, and for the defense against conventional or nuclear missiles launched from land, sea, or the air. As an American naval official put it in 2007, "when you go through the Panama Canal, every terrorist and his brother knows you're there. When you go through the Arctic, no one knows you're there".[105] Unlike Antarctica, the Arctic is not demilitarized, and is unlikely to become demilitarized in the foreseeable future. Most likely, the deep and partly ice-covered waters of the Arctic Ocean will remain a potential hiding place for missile-carrying nuclear submarines. The region may also become more accessible to naval surface forces from Arctic and non-Arctic states. This is not to say that we should expect a radical increase in the range and scope of military activity in the Arctic. But it should be recognized that the region is still seen, and will continue to be seen, as militarily important to at least some Arctic states.

Nuclear submarines can operate autonomously under the cover of the Arctic ice canopy for long periods of time. They can rise to the surface, push their way through several meters of ice, and take up firing positions anywhere in the Arctic Basin, including the North Pole. Such scenarios, including the launch of missiles, are being rehearsed by the navies of Russia and the U.S. on a more or less regular basis. As late as in October 2009, a nuclear-powered U.S. attack submarine – the USS Texas – surfaced on the North Pole. Such operations require special training and are associated with significant danger, not only to the fragile Arctic environment, but also to the submarine crews. In March 2007, two British sailors lost their lives in an accident aboard the HMS Tireless, a Trafalgar-class hunter-killer submarine, which was participating in a joint exercise with U.S. submarines under the Arctic ice cap north of Alaska.[106]

In the case of Russia, the sea-based nuclear weapons on the Kola Peninsula and on the Pacific Coast are seen as an important part of the country's nuclear arsenal, and they contribute to upholding the country's status as a great power. However, compared to its Cold War equivalents, the Russian SSBN fleet has shrunk and is badly deteriorated. The building of a fourth-generation class of strategic submarines (the "Borey" class) and the development of a new ballistic missile system ("Bulava") have been significantly delayed. As a result of this, the number of Russian submarine patrols in the Arctic is still fairly limited. Even though the military activity level in the north is lower today than it was in the days of the Cold War, military considerations still play a role in the formation of national strategies and policies. As the Russian Navy's Chief Navigator, Admiral Valeriy Aleksin, formulated it in an interview with the *Ogonek* magazine in 1995, "he who controls the Arctic, controls the world".[107]

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[105] Barry L. Campbell, Head of Operations at the US Navy Arctic Submarine Laboratory in San Diego, California, cited in Caitlin Harrington: "Eyeing up the new Arctic: competition in the Arctic Circle", *Jane's Defence Weekly*, Vol. 45, No. 3 (16 January 2008), p. 26.
[106] "Two Die in Accident on British Nuclear Submarine", *AFP*, 21 March 2007, http://www.spacewar.com/reports/Two_Die_In_Accident_On_British_Nuclear_Submarine_999.html.
[107] "Kakoi flot nuzhen Rossii?" [What kind of Navy does Russia need?], *Ogonek*, 1995, No. 29, p. 37.

Russia's strategic interests in the Arctic are closely related to the country's economic interests in the region. There is a widespread fear that other states may be tempted to take control over Russia's natural resources as the ice cover recedes.[108] This fear is often coupled with Russia's traditional fear of NATO, which is a central topic in Russia's security and defense planning, particularly with regard to the European Arctic. Take for instance this statement by Colonel (Ret.) Anatolii Tsyganok of the Center for Military Forecasting in Moscow:

> We think the situation is very dangerous and serious, and we also think that NATO [North Atlantic Treaty Organization] will transform from a defence alliance to a bloc which will fight for energy resources, and it will fight for its interests by military means […] Since 2002–2003 the Norwegian Navy has had several warships protecting their fishing fleet off Spitsbergen [Svalbard], and I don't exclude that Russia might send its navy there too.[109]

Along the same lines, a 2003 *Pravda* article titled "Spitsbergen: NATO's outpost under Russia's nose" listed a number of Russian security concerns pertaining to the archipelago of Svalbard. The article claimed that the Svalbard Environmental Protection Act – a piece of legislation adopted by the Norwegian Parliament in 2001 – was aimed at hindering Russian mining activities and could be forcing Russia to abandon the archipelago. It also claimed that Norway was violating the demilitarization clause of the 1920 Svalbard Treaty by allowing the construction and operation of radars and satellite stations that allegedly could be used in a U.S. missile defense scheme.[110] Norway's rejection of these allegations appears to have had little effect on mainstream Russian perceptions.

Today, more than two decades after the end of the Cold War, Russia's relations with NATO are still marked by a startling lack of trust, as illustrated in the 2006-2009 "missile defense" debate and the controversy over NATOs plans for further enlargement into the post-Soviet space. Russia is also concerned that that ship-based missile defense systems may be deployed in the Arctic.[111] Though not at Cold War levels in terms of frequency, Russia and the U.S., maybe also the U.K., are likely to maintain their ability to conduct SSBN and SSN operations in the Arctic Ocean and its adjacent waters, and this activity will inevitably bear with it the risk of incidents, accidents, or worse: an accidental launch of missiles. An increase in the number of naval surface vessels operating in the region can also not be excluded, as indicated by Canada's efforts to strengthen its naval presence in the northern waters. However, despite numerous claims to the contrary, there are few indications of a "new Cold War" in the Arctic.

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[108] Andrei Smolovskiy: "Voyenno-strategicheskaya obstanovka v Arktike" [The Military-Strategic Situation in the Arctic], *Morskoi sbornik*, 2006, No. 11, p. 57.
[109] Gwynne Dyer: *Climate Wars*, Canada: Random House 2009, p. 38.
[110] Pavel Rivetov "Shpitsbergen – forpost NATO pod nosom Rossii" [Spitsbergen: NATO's outpost under Russia's nose], *Pravda online*, 14 April 2003.
[111] "U.S. could deploy missile shield in Arctic – Russia's NATO envoy", *RIA Novosti*, 29 September 2009, http://en.rian.ru/russia/20090929/156282845.html.

5 Meeting the New Security Challenges

5.1 Mitigation and Adaptation Strategies

Obviously, there are many uncertainties when it comes to whether, how, how much, and how soon the process of climate change will alter security dynamics and security politics in the circumpolar Arctic. What is clear, however, is that changes in the region's physical environment – the exact tempo of which is still uncertain – are likely to present policy planners and political decision-makers with a wide array of challenges that will require extraordinary measures at the national as well as at the regional and international levels. Polar ice melting, sea level rise, permafrost thaw, and coastal erosion may force governments and international organizations to rethink traditional security concepts and develop appropriate strategies aimed at mitigation and adaptation. The term "mitigation" here denotes any action taken to *reduce or eliminate the causes* of climate change, such as cuts in greenhouse gas emissions. The term "adaptation", on the other hand, refers to our ability to *adjust to the consequences* of climate change in order to moderate harm and/or take advantage of possible new opportunities. Most likely, we will see a combination of mitigation and adaptation strategies at various levels.

In the Arctic, the *indirect* effects of climate change as a potential "multiplier" of existing or latent intra- and interstate disputes may not necessarily be less severe than its *direct* effects on the Arctic environment. Seen from a security perspective, the two types of challenges are inherently different, and will require different countermeasures undertaken by different actors. Military planners are, for obvious reasons, most preoccupied with the second type of concerns. Environmental security challenges, in the Arctic or elsewhere, cannot be averted by the threat, display, or use of military force, and they are typically dealt with in different fora than state security challenges. At the same time, it should be recognized that efforts to address the immediate causes of the problem (e.g., limiting greenhouse gas emissions) and, to the extent possible, reduce the pace of anthropogenic change, may lower the risk of secondary effects such as the ones discussed above (conflicts over access to increasingly scarce renewable and non-renewable natural resources and/or emerging marine transport routes).

The apparent *interconnectedness* between the direct and the indirect effects of climate change is, however, neither fixed nor total. It is, at least in theory, fully possible to imagine climate change, even dramatic climate change, without political destabilization and conflict. Central intervening variables in the relationship between climate change and conflict are the roles played by governments, political institutions, and regional and international organizations in managing the process of environmental change and containing potential intra- and interstate tensions. Under some conditions, the adverse impacts of climate change may even lead to increased *dialogue and cooperation* between states that are facing the same or similar challenges, and facilitate the settlement of long-standing disputes such as the ones that exist in the circumpolar Arctic. Contributions towards this aim can be made at several levels.

At the *national level*, all of the states that surround the Arctic Ocean will work to secure their short-, medium- and long-term strategic and economic interests in the region. The region's new

role as a potential energy province and transport corridor implies that the stakes are high for all of the involved parties, and none of the Arctic states seem to be willing to offer substantial concessions to their neighbors in the name of regional stability. This may point towards an increase in the level of interstate tension. On the other hand, all of the Arctic states recognize the crucial role of international law, including UNCLOS, in the settlement of current and future interstate disputes over access to maritime and shelf areas in the region. Unlike other and more conflict-prone regions, the Arctic is a region of economically developed and politically stable countries, which have a long tradition of peaceful coexistence. Thus, even though the effects of climate change on ecosystems are likely to be more extensive in the Arctic than in many other places, the consequences for regional peace and stability may turn out to be less severe here than in many other parts of the world, such as sub-Saharan Africa.

At the *regional level*, institutionalized cooperation arrangements such as the Arctic Council and the Barents Euro-Arctic Council can play an important role in the maintenance of regional stability. These and other components of the multifaceted system of Arctic governance do not have the authority to make formally binding decisions on legal or other matters, but they are important arenas for interaction and cooperation among Arctic states on issues of common concern. For instance, by initiating regionally oriented academic studies such as the *Arctic Climate Impact Assessment* (2005) and the *Arctic Marine Shipping Assessment* (2009), the Arctic Council has drawn the attention of its member states and the outside world to emerging security and other concerns in the region, and created common understandings of possible ways to meet them. Central in this regard is the Council's role as a "soft law" institution, as illustrated by the process leading up to the adoption of the updated *Arctic Offshore Oil and Gas Guidelines* in 2009.

Finally, it should be pointed out that the issue of climate change, and its security implications for the Arctic region, are to be dealt with also at the *international level*. The observed increases in air and water temperature in the Arctic and the melting of sea and glacial ice are not only regional, but also global security concerns. Processes taking place in the northern part of the globe are likely to affect the rest of the world in a number of ways, most notably through sea-level rise. The driving forces behind the process of global climate change will have to be addressed in a collective manner, and few organs are better equipped to coordinate the effort than the United Nations. In addition to coordinating global processes addressing the source of the problem, the UN system can assist the Arctic states in settling disputes. Most importantly, the Arctic states can draw on tools such as the Law of the Sea Convention, and increasingly relevant UN organs such as the Commission on the Limits of the Continental Shelf (CLCS) and the International Maritime Organization (IMO).

5.2 Implications for Military Planners

The ongoing changes in the physical environment of the Arctic are likely to have a profound impact not only on national, regional, and international political agendas, but also the future task portfolio of navies and coast guards, particularly those of the Arctic coastal states. The direct and indirect effects of climate change may also lead to changes in the way military capabilities are

used on land, in the air, and in space. As pointed out in the introductory chapter, the main purpose of this report has been to shed light on the interplay between climate change and security in the northernmost part of the globe, and the long-term conflict potential in the region. The report does, in other words, not aim to cover the "capability requirements" dimension at any length or detail. Decisions pertaining to the future size and composition of Norway's military forces will have to be made at the political level. However, on a more general level, the study has identified a number of "issue areas" that deserve the attention of military planners and political decision-makers in Norway, and for that matter, other Arctic nations, in the years and decades to come:

- *Cold weather operations*: The ability to conduct military operations in harsh climatic conditions is likely to remain important, not only to the Arctic rim states, but also non-Arctic states operating in mountainous and/or cold regions elsewhere in the world (e.g., Afghanistan). Such operations require special training and preparation, and place heavy demands on equipment and logistics. Given its northern location, and as host nation to NATO's Center of Excellence for Cold Weather Operations (COE-CW), Norway has a high level of competence in this field. This competence should be maintained and further developed, to the benefit of allies and partner nations doing winter training in Norway.

- *Arctic maritime domain awareness*: Within the Arctic maritime domain, it is important to raise awareness about the complex challenges that naval, coast guard, and commercial shipping organizations, as well as the petroleum and fishing industries, may be facing in the future. A central point in this regard is the need for a further strengthening of inter-service and inter-agency coordination and cooperation at the national level, optimizing information sharing and situational awareness within the Arctic maritime domain.

- *Ocean and air surveillance*: An increase in ship traffic and/or other commercial activities in parts of the Arctic, such as the Barents Sea, will require an improved ability to monitor what is going on the ocean surface at any given time (ship movements, pollution, sea ice, etc.), as well as in the airspace above it. This presupposes the integration of information from sources such as satellites, ship tracking systems (AIS), land-based radars, maritime patrol and other fixed-wing aircraft, helicopters, coast guard and naval vessels, and so on. There is reason to believe that the space-based component of the surveillance system will become more sophisticated in the future, and provide better coverage. For instance, the upcoming (July 2010) launch of the "AISSat-1" – a nano satellite developed at FFI – may significantly improve the monitoring of maritime activities in the European Arctic. It is also important to facilitate the cross-border exchange of data at the regional level. The "Barents Watch" project in Northern Europe is an interesting pilot project in this regard.

- *Enforcement of fishery regulations*: The management of the Arctic's living marine resources and the prevention of illegal, unreported, and unregulated (IUU) fishing in the northern waters are likely to remain important tasks for the coast guards of Arctic coastal states. The northwards movement of fish stocks, due to rising waters temperatures, may create additional challenges as fish stocks may move from one state's economic zone into

that of another. The management of the joint fish stocks will require enhanced bilateral and multilateral cooperation and a credible presence by coast guard vessels on the major fishing grounds. This may also contribute to the prevention of interstate fishery disputes.

- *Enforcement of marine transportation regulations*: The Arctic coastal states have a common interest in making sure that national and international regulations governing ship traffic in the Arctic are enforced and complied to. This is important in order to prevent ice-related or other accidents or oil spills in the Arctic Ocean and the seas and coastal regions that surround it. The United Nations' International Maritime Organization (IMO) and regional cooperation arrangements such as the Arctic Council (AC) will hopefully continue to play an important role in the drawing up of regulations and "soft law" guidelines for marine transportation and cruise traffic in the Arctic, but the success of their efforts cannot be achieved without an adequate enforcement presence at sea.

- *Search and rescue operations*: An increase in industrial activity, fisheries, and/or ship traffic in the Arctic could render current search and rescue (SAR) systems inadequate, particularly in maritime areas far from the shore. As noted in the 2008 Ilulissat declaration (see p. 23), there is a need to strengthen SAR capabilities and capacity in and around the Arctic Ocean. In large parts of the region, SAR resources are still scarce and far between, and they have limited reach. The number of passengers on cruise ships operating in the Arctic often exceeds the capacity of the available SAR response vessels and aircraft. The shortcomings in Arctic emergency response preparedness may be alleviated through a strengthening of national SAR assets, enhanced bilateral cooperation, and the adoption of an Arctic SAR Treaty under the auspices of the Arctic Council.

- *Tugboat capacity*: In regions of considerable or growing tanker traffic, such as the Norwegian West Coast, the availability of tugboats may be a source of particular concern. In the event of an engine failure or some other kind of emergency, particularly in rough weather and/or in waters close to the coastline, unsatisfactory availability of relevant rescue capabilities could result in a major environmental disaster. Some coast guard vessels may be used as tugboats, whereas other may not, depending on weather conditions and the size of the vessel in distress. In some scenarios, specialized civilian tugboats are clearly preferable. In any event, one should pay attention to the topic of tugboat availability and seek to optimize the cooperation between all relevant agencies.

- *Maritime security operations*: As the sea ice retreats and the Arctic region becomes more accessible than it has been in previous times, the "constabulary tasks" in waters adjacent to the Arctic Ocean may increase in scope and number. An increase in ship traffic and other forms of human activity in the region may, for instance, lead to an increase in smuggling or illegal migration. Other and more serious forms of illegal activity, such as piracy and sea-based terrorism, seem less likely in the Arctic than in most other maritime areas, at least in the foreseeable future, due to the absence of land-based infrastructure.

- *Submarine and anti-submarine warfare operations:* Due to its geographical location, size, water depths, and ambient noise conditions, the Arctic Ocean is likely to remain a potentially important arena for strategic nuclear submarine (SSBN) operations. However, as large parts of the Arctic Ocean become open water, anti-submarine warfare (ASW) operations may become more efficient, and submarines may become easier to track from the surface. Stealthy diesel-electric submarines (SSKs) will probably continue to have a role as a surveillance asset and a defensive weapon in waters closer to the shore.

- *Communication systems:* Developments such as the ones described above may also require a strengthening of C4ISR[112] interoperability. Given the anticipated complexity of future coast guard, naval, or joint operations in the Arctic, the interoperability of communication systems is likely to become an increasingly important issue. The need for interoperable communication systems is also evident at interstate level. This issue area includes not only technical solutions, but also user competence and language skills.

- *Logistics:* An increase in the frequency and/or length of surface vessel patrols in waters further from the shore may raise some challenges related to logistics support. Delivery of supplies, fuel, and spare parts may not be easily available, or at all available, and such factors need to be given careful consideration prior to long-distance deployments.

- *Bathymetric mapping:* Knowledge about the underwater topography is essential for most, if not all, naval operations. Bathymetric charts may improve the safety of surface as well as sub-surface navigation, and help ASW forces in detecting foreign submarines operating in both deep and shallow water. Not all Arctic waters are sufficiently charted, and additional surveying is needed in order to produce new and more detailed maps. This is especially true for areas that are ice-covered, where few bathymetric data are available.

- *Weather and ice forecasting:* The ability to predict meteorological, oceanographic, and sea ice conditions is also an essential part of military exercises and operations in the Arctic. Meteorological and oceanographic data need to be tailored to the needs of the forces that are to use them. The forecasts may vary in detail, duration, and geographical scope, depending on the location and operational needs of one's vessels and/or aircraft. Also merchant ships operating in the Arctic will need high-quality weather and ice data.

- *Knowledge-building:* Military planners – and the institutions that employ them – should work towards a higher level of understanding of the various aspects of climate change, as well as its potential security implications in regions such as the Arctic. The changes in the physical environment of the region may, as noted above, have significant bearing on the region's future as an arena for naval and coast guard operations. It may also lead to changes in the geopolitical dynamics and Arctic interstate relations. Multidisciplinary research and interaction with non-military institutions at home and abroad can make military planners better equipped to meet the future challenges of climate change.

[112] Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance.

5.3 Concluding Remarks

This report has sought to shed light on various aspects of the process of climate change and its security implications in the northernmost part of the globe. The dramatic changes that are taking place in the circumpolar Arctic – ice melting, permafrost thaw, coastal erosion, sea level rise, etc. – are likely to have a major impact on the security situation of the countries that surround it, as well as the rest of the world, in the decades to come. The changes raise a number of new environmental security concerns, as well as concerns related to the dynamics of interstate relations and the danger of a "remilitarization" of the region. The direct and indirect impacts of climate change, and their consequences for political and military planning at various levels, are still not fully understood. Further research is needed. The dialogue between natural scientists and social scientists on the topic of climate change is still fragmented, and few social scientists have began to explore the vast amounts of data that natural scientist have provided for us in recent years. Similarly, natural scientist are not always aware of the aspects of the topic that social (e.g., political) scientists are most interested in, such as the "peace and conflict" dimension.

In recent years, it has become fashionable, at least in the press, to talk about the Arctic in conflictual terms. The region is often described as an arena where states are preparing for a future "resource race" and a new "great game". However, as pointed out in Chapter 1, the link between climate change and conflict is far from self-evident, and there are many other intervening variables such as the role of governments, regional and international institutions, and international law. And even though there are a number of unresolved issues pertaining to borders and jurisdiction in the northern waters (see Chapter 2), they are not necessarily more complex or numerous than those in maritime areas of comparable size elsewhere in the world. In addition comes the fact the Arctic is a generally peaceful region, surrounded by politically stable and economically developed countries which, despite their disagreements, have a long tradition of cooperation and peaceful coexistence at the regional level. This gives ground for a certain amount of optimism when it comes to the prospects for a peaceful resolution of the remaining issues. The settlement of legal disputes and establishment of "rules of the road" for shipping and offshore petroleum activities can improve the prospects for a peaceful, stable, and prosperous Arctic.

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