

# Melting sea ice, changing naval geopolitics: The impacts of climate change in the maritime delimitations in the Arctic and the challenges to the UNCLOS

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## **ABSTRACT**

The Arctic, deeply affected by climate change, is experiencing a shrinking cryosphere in the Arctic Circle, seen by polar states as an economic and strategic opportunity. Although this “normality” has generated geopolitical challenges in the region,

marked by cooperation since the Cold War, it is now transformed into conflict. Russia and Western states intensify military operations, accusing each other of military escalation. However, an underestimated aspect is the geopolitical assessment of melting ice and sea level rise, especially its impact on the low tide line and United Nations

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Convention on the Law of the Sea (UNCLOS) regulations. This article discusses the results of sea level rise on the territorial and geopolitical aspects of the Arctic Ocean.

**Key words:** Arctic; Climate change; Geopolitics; UNCLOS; Maritime disputes.

## **Deshielo, cambio de la geopolítica naval: los impactos del cambio climático en las delimitaciones marítimas en el ártico y los desafíos de la Convemar**

### **RESUMEN**

El Ártico, afectado profundamente por el cambio climático, experimenta una disminución de la criosfera en el Círculo Polar Ártico, vista por los Estados polares como una oportunidad económica y estratégica. Aunque esta “normalidad” ha generado desafíos geopolíticos en la región, marcada por la cooperación desde la Guerra Fría, ahora se transforma en conflicto. Rusia y los Estados occidentales intensifican operaciones militares, acusándose mutuamente de intensificación militar. No obstante, un aspecto subestimado es la evaluación geopolítica del deshielo y el aumento del nivel del mar, especialmente su impacto en la línea de marea baja y las regulaciones de la Convención de las Naciones Unidas sobre el Derecho del Mar (Convemar). Este artículo discute los resultados del aumento

del nivel del mar en los aspectos territoriales y geopolíticos del océano Ártico.

**Palabras clave:** Ártico; cambio climático; geopolítica; Convemar; controversias marítimas.

### **INTRODUCTION**

The Arctic has become one of the most important issues in International Politics in recent times due to climate change, attracting academic interest from a growing number of scientists of many different fields (Biresselioglu, *et al.*, 2020). Geopolitically speaking, this polar region is considered increasingly strategic in virtue of two main reasons: first, the fact that the region has been suffering the effects of climate change in a far more intense way when compared to the rest of the world (Rantanen, *et al.*, 2022); second, the fact that regional geopolitics has been turning from a three-decades-long cooperation period to a new competition and rivalry one (Ebinger & Zambetakis, 2009), opposing Russia to the Western bloc of Arctic nations.

Due to its specific geographic characteristics, the Arctic simultaneously maintains a status as a frontier of strategic protection and the “last frontier” of geopolitical and geoeconomic expansion for all the States within the polar territory (Zysk, 2020; McCannon, 2012). This region, isolated for centuries on account of its hostile and extreme environment, has gradually experienced an expansion in both economic and military activities of all regional

actors – most intensely Russia, which has sovereignty over 40% of the total Arctic territory—due to the new climatic conditions created by the process of global warming (Jin *et al.*, 2023; Hogg, Fonoberova & Mezić, 2020; Serreze & Meier, 2019; Serreze *et al.*, 2016), which has been more intensely felt in this region than in the rest of the planet (Rantanen *et al.*, 2022; Mc-Crystal, *et al.*, 2021; Chen *et al.*, 2021; Choudhary, *et al.*, 2021). All this is owing to a phenomenon scientifically called Arctic Amplification, an ice melting cycle caused by climate change that gets trapped into a feedback loop of warming and melting (Chylek, *et al.*, 2022; Serreze, *et al.*, 2016; Serreze & Barry, 2011). This climatic process, while contributing to the dissolution of the large blocks of ice in the Arctic region (Zellen, 2009), allows the Arctic Ocean to have higher navigability rates leading to the expansion of shipping corridors (Gascard, *et al.*, 2017; Wang, *et al.*, 2016), with projections of an ice-free Arctic in certain periods of the year (Zhou, *et al.*, 2022) which will impact the global climate (Wu & Li, 2021) while simultaneously creating opportunities as well as national security challenges for the polar states, including the United States (Strawa, *et al.*, 2020; Chalecki, 2007) and to Russia (Antrim, 2011; Anderson, 2009), mostly by reason of their longtime rivalry, military power, and political leadership.

Increasing geopolitical tensions, combined with a process of technological development that allows the expansion of operations, transport, and even the possibilities of human life in this extreme

environment, have made the region subject to a new cycle of competition between regional powers and “catapulted the Arctic into a center of geopolitical interest, as its melting ice has transformed the region, originally one of scientific interest, into a vortex of environmental concerns, national security and commercial competition” (Ebinger & Zambetakis, 2009, p. 1215), including extra-regional players such as China (Tillman *et al.*, 2018). The change in the environmental and geopolitical *status quo* in the Arctic has made it a challenging environment – for all the Arctic nations, but especially for Russia, due to its large polar territory—far beyond the traditional limitations and difficulties created by the hostile and extreme natural environment of the polar region.

In this paper, we argue that the climate change process has been affecting the naval geopolitical relationship in the Arctic—as the polar nations have been adapting their own naval strategies to the new subsea economic potential created by the melting sea ice and new operational conditions in the region – which, in turn, has been creating challenges to the United Nations Convention on the Law of the Seas (UNCLOS). These challenges involve, we argue, states’ moves with the potential to raise tensions, especially between the West and Russia, due to new baselines that may arise from rising sea levels, consequently changing the UNCLOS measurement of territorial sea, contiguous area, and exclusive economic zones.

The argument is developed in four parts: first, we briefly describe the methodology

used in our research, and establish the theoretical framework used to structure the research; second, we describe the Arctic as a natural and geopolitical territory; third, we describe how climate change has been affecting sea ice in the Arctic, opening new areas for economic exploration and facilitating navigability, but at the same time creating future points of conflict; and fourth, we discuss how melting ice is altering the geographic organization of the Arctic, affecting Russian geopolitical perceptions, and generating potential challenges to UNCLOS in the near future, with the possibility of escalation.

#### **METHODOLOGY AND THEORETICAL FRAMEWORK**

We have employed, for the current research, a *comprehensive literature review methodology* to investigate the Arctic region from a multidimensional *and* interdisciplinary perspective. The chosen literature have followed the logic of bringing different fields and knowledge together to better explain the intricacies of the climate change outcomes in the polar geopolitics: first, the geographic literature on the Arctic provided insights into the physical characteristics of the region; second, historical literature on the Arctic facilitated an understanding of past events, human interactions, and the evolution of geopolitical dynamics in the area; third, climatology offered valuable data and analyses regarding the environmental shifts occurring in the Arctic, including ice melt, temperature variations, and their implications

for the economy and military behavior of the polar states; fourth, strategic studies literature contributed strategic perspectives on geopolitical interests, security concerns, and resource management strategies within the Arctic circle; fifth, legal literature was consulted to explore how UNCLOS and recent international legal decisions (taken by the International Court of Justice – ICJ and by the the United Nations Commission on the Limits of the Continental Shelf–CLCS) on continental shelf rights have been facing challenges due to the changing baselines in virtue of climate change.

Although the current study is primarily focused on the literature review, the incorporation of a theoretical framework from the field of International Relations was pivotal in shaping the research methodology. Due to the multidimensional characteristic of the issue, we opted to utilize Robert Gilpin's theory of Hegemonic Stability (Gilpin, 2010) to elucidate the determinants influencing the behavior of Arctic States. His analysis, through a rational calculation that weighs marginal benefits against marginal costs of a certain geopolitical action, considers various internal and external factors, which in the case of the present work include the impact of climate change on sea levels, maritime boundaries, and polar ice melting, as well as the contemporary context marked by escalating tensions between Russia and other Arctic states following the annexation of Crimea in 2014 by the latter, and the subsequent war against Ukraine post-2022. Gilpin's insights into rational political action and cost-benefit analysis

provided a valuable lens for understanding the drivers of State behavior. While Gilpin's theory serves as a guiding framework for this study, its detailed exposition falls outside the scope of our analysis.

### **DEFINING AND DELIMITATING THE ARCTIC, ITS NATURE AND GEOPOLITICS**

The northernmost region of the Earth, the Arctic has multiple definitions, and it is no easy task to come up with a single definition or delimitation of it (McCannon, 2012). This polar zone comprehends landmasses, oceans, river basins, taiga tree lines, a complex network of islands as small as Hans Island (with its 1.3 km<sup>2</sup>) or as big as Greenland (with its more than 1,1 million km<sup>2</sup>), an immense variability of peoples, both native and foreign, a rich biodiversity in land and on sea, and a vast geographic diversity along 3 continents (Europe, Asia, and North America) and at least 10 countries in its immediate regional complex: the United States, Russia, Canada, Denmark (through Greenland), Norway, Sweden, Finland, and Iceland with territory within the Arctic Circle, and the United Kingdom and Japan with some territories not far from it.

When the task is to broadly define the Arctic, it can fit into as many definitions such as: a geographical area North of the globe; a magnetic pole; a partially closed-water ocean; the entire region above latitude 66°34'N (the Arctic Circle); an area in which the average minimum temperature during the warmest month is below 10°C; and, in most people's minds, a cold,

ice-covered, wild, inhospitable land, home to foxes and polar bears, of thick sea ice and igloos. It can also be seen as a geopolitical chessboard that places Russia on the one side and the North Atlantic Treaty Organization's (NATO) member-states on the other, a cold "hot" zone where two major rivals – the US (leading the alliance of NATO countries) and Russia – have been facing each other – territorially and strategically – since the early days of the Cold War in 1947, with its strategic bombers and intercontinental ballistic missiles pointing to one another. As McCannon (2012) puts it, "by rule-of-thumb reckoning, the Arctic consists of 11 million square miles of sea and solid land. Delimiting this territory, however, is no straightforward task, for no generally agreed-upon definition exists for it" (p. 9). The Arctic is still a "cartographic abstraction" (p. 10) for much of its fundamental geography, since it is not a homogeneous area, neither in nature nor in geopolitics, each region comprising its own peculiarities, human and natural.

For the purpose of this work, the Arctic can be defined in two ways: geographically, as the area within the Arctic Circle, comprising the territories inside a circle that goes from latitude 66°34'N all the way up to the North Pole, at a 90°N latitude, with a specific climate system in which the average minimum temperature during the warmest month is below 10°C, an unbalanced solar irradiation index along the year (with a 6-month long period of predominant sunlight, followed by a 6-month long period of predominant lack of sunlight), and a surface

partially covered by snow and sea ice; and geopolitically, as the polar region North of the planet, composed by the Arctic Ocean in the center and adjacent lands, and the naval passages through the Behring Strait connecting to the Pacific Ocean in the East, and the GIUK Gap between Greenland, Iceland and the United Kingdom connecting to the Atlantic Ocean in the West.

Historically, the Arctic has been subject to human exploration since at least 14,000 BCE, when the Behring land bridge was crossed by Asian human groups on their way to warmer lands (McCannon, 2012). It was no easy region to establish settlements, though Arctic settlements can archaeologically be traced back to, at most, 2,500 BCE (McCannon, 2012), and the “modern” form of settlement in the region by a type of political organization which resembles modern statehood, dates to the 1400s (McCannon, 2012; Hosking, 2011). It was only with the rise of new technologies – in construction, heating, transportation, food, and clothing – that the Arctic has become less inhospitable for larger groups of non-nomad inhabitants, something that did not happen before the rise of the Industrial Age in the early 19<sup>th</sup> century, when effective, large-scale settlements in the Arctic began to appear (Hønneland, 2016; Bruno, 2016; McCannon, 2012; Bushkovich, 2012; Hosking, 2011); before that, most non-indigenous settlements were seasonal, related to exploitation of polar commodities: fur, fisheries, whaling and wood (McCannon, 2012). It was only in recent times (i.e. in the 20<sup>th</sup> century) that the Arctic has been

subject to a more intense process of occupation (McCannon, 2012), for both economic and military purposes by most, if not all, Arctic countries (Zysk, 2020).

Russia was, evidently, one of the nations that benefited the most from the Arctic, not only due its control of over 40% of the Arctic’s territory, but also due to the fact that the Arctic has been part of Moscow’s strategy and Russian identity ever since Peter the Great started the venture (continued by his successors) of widely occupying Siberia – and putting it under the Russian flag and sovereignty (McCannon, 2012; Bushkovich, 2012; Hosking, 2011; Baikalov, 1932).

Historically, this Russian stance – geographical and geopolitical – in the Arctic has made it compete with other polar nations, whose territories in the Arctic have also been subject to economic and military expansions over the years, but most intensely after the creation of the North Atlantic Treaty Organization (NATO) in 1947. Russia – and its 20<sup>th</sup> century predecessor the Soviet Union – has seen these moves as a threat to its very existence (Burke, 2022; Bruno, 2016), as the Arctic is seen by Moscow as its strategic “*polar heartland*” and, in some Russian nationalist circles, as its *Lebensraum* (Laruelle, 2014). This view of the Arctic as an area that is fundamental for the very existence of the country is shared by six of the seven other polar nations: Canada, Denmark, Sweden, Finland, Iceland, and Norway have placed the region not only as strategic, but also as existential; the only exception here is the United States, which

sees the area as strategic, but not necessarily existential, since most of its territory is far from the Arctic Circle.

In recent times, all the Arctic countries from the Western bloc have increased their military presence in the region with a triple purpose: to support NATO's operations to contain the Russians, to improve national capability to safeguard their own geopolitical interests, and to defend their economic activities in the region. Canada amended its Arctic and Northern Policy Framework in 2022, and has expanded its Arctic military exercise, codenamed Nanook, to four deployments every year; the United States amended its Arctic Policy, and activated a new polar military unit – the 11th Airborne Division, based in Alaska and focused on Arctic warfare – and increased its support to military actions performed by other countries with a regional role within NATO (Zysk, 2020; Pincus, 2020a); Finland and Sweden joined NATO after decades of neutrality, as a measure to defend themselves from a potential Russian aggression, and began rethinking their own Arctic Policy and strategies which date back to the first decade of the current century; Denmark has been reforming its Arctic strategies and policies since 2022 due to a growing friction with Russia, a measure which is also being adopted by Iceland; and Norway, which has taken the chairmanship of the Arctic Council from Russia, faces issues related to its territory of Svalbard, which keeps a system – under international treaty – of territorial permits for Russian non-military activities in the archipelago. Additionally, all the

Western nations with territory in the Arctic have suspended their participation in the Arctic Council during the Russian mandate (2021-2023) in retaliation for the invasion of Ukraine by Russia in 2022. These moves by Western actors have generated a strong change in the Russian historical cooperative position on the region, which existed since the Murmansk Initiative launched in 1987 by the former Soviet Union, and were used by Moscow as a justification to change the Soviet-era cooperative policies to a more competitive – and to some extent much more aggressive – geopolitical strategy (Russia reformed its strategies and policies for the Arctic in 2023).

This Soviet political landmark stated that the USSR (or former Soviet Union) would adopt a new political guideline for the region, one of cooperation with other Arctic states through science, research, environmental regulation, and more friendly behavior in the military field (Burke, 2022; Antrim, 2011; Hosking, 2011). This soviet initiative was fundamental for the creation of the Arctic Council in 1996, after the fall of the USSR. When Vladimir Putin came to power in 1999, his relationship with the West was cordial. Nonetheless, he started to promote changes in Russia to restore its relative power (Hosking, 2011), even at the cost of degrading relationships with the Western bloc – which was aggravated with the invasions of Crimea in 2014 and the war in Ukraine in 2022. Growing tensions with the West after the crises in Georgia (2008) and Crimea (2014) did not have immediate effect in the Arctic geopolitics,

which kept the same cooperative pattern of the 1980's, much due to Moscow's will to keep unchanged the 1987 Soviet policy for the region. The change in the Russian Arctic Strategy in 2020 and the full-scale invasion of Ukraine in 2022 changed everything. With them, the Russian policies for the Arctic changed, their political and diplomatic tone changed, and the geopolitical chessboard of the High North changed too (Zysk, 2020). To better comprehend how the new perspectives for the Arctic have profoundly altered the Russian Federation's relationship with its traditional rivals (Zysk, 2020; Pincus, 2020a), and how Moscow now foresees not only the economic potential of the High North, but also the need for a more intense Arctic strategy, one that creates a balance between economic expansionism and military active defense (Zysk, 2020), we must understand how climate change is affecting the Arctic.

#### **MELTING ICE, RISING SEA: CLIMATE CHANGE AND ITS IMPACTS ON THE ARCTIC**

The Arctic has been one of the areas in the world most affected by climate change in recent years (Jin *et al.*, 2023; Rantanen *et al.*, 2022; Chylek *et al.*, 2022; McCrystall *et al.*, 2021; Chen *et al.*, 2021; Choudhary *et al.*, 2021; Hogg *et al.*, 2020; Serreze & Meier, 2019; Serreze *et al.*, 2016) due to the phenomenon of Arctic Amplification (Serreze & Barry, 2011). As the planet warms, the Arctic ecosystem faces intensified impacts, particularly due to accelerated ice cover reduction caused by melting ice

and darkening waters. This feedback loop, influenced by climate change, involves complex interconnections, including alterations in the hydrological cycle, reduced cloud presence, changes in ocean circulation and temperature, and shifts in Arctic Ocean salinity. It works in the following way: increased evaporation and vapor transportation in the atmosphere lead to ice cracks and decreased ice reflectivity, exacerbating the warming process; additionally, reduced cloud cover during Arctic winter further enhances water evaporation, reinforcing the feedback loop; global ocean temperature changes affect sea currents entering the Arctic, altering temperature dynamics and salinity; changes in atmospheric vapor and salinity degrade polar ice, leading to thinner, less durable ice and hindering multi-year ice formation. Notwithstanding the problems on the sea, this cycle also extends to land, where melting permafrost releases methane, exacerbating greenhouse gas effects and amplifying the feedback cycle of warming and melting (Isaksen *et al.*, 2022; Chylek *et al.*, 2022; Rantanen *et al.*, 2022; McChrystall *et al.*, 2021).

The reduction of the cryosphere in the Arctic Circle (Zellen, 2009), as seen above, in spite of its catastrophic environmental effects, has facilitated the polar navigability conditions (Zhou *et al.*, 2022) and opened possibilities of new shipping lanes and naval corridors (Gascard *et al.*, 2017; Wang *et al.*, 2016), allowing ships to operate in better conditions for a longer period throughout the year. The increase in ice-free areas within the Arctic Ocean also open new



possibilities for the exploration of underwater resources, as an ice-free Arctic scenario (Zhou *et al.*, 2022) becomes a reality due to a harsher impact of climate change in the region (Wu & Li, 2021). The accelerated growth of Arctic polar melting has allowed countries such as Russia, Canada, the United States, and Norway to expand their oil and gas extraction operations in already known reserves, as well as prospecting for new areas, with considerable economic gains, turning it into a new frontier of disputes between regional states, even extra-regional actors such as China (Strawa *et al.*, 2020). Specific policies from these countries – as well as United Kingdom’s 2023 policy to authorize oil drilling on the North Sea – have been put into effect. Other Arctic states have already begun to study the adoption of such economic policies.

Due to the inevitable evidence in the data, in the scientific field the consensus is that global warming and climate change are affecting the Arctic more than other regions. As Stroeve & Meier (2012) wrote:

Over the past few decades, the Arctic has warmed at about twice the rate as the rest of the planet. As a result, significant changes are happening in the Arctic sea ice cover, with potentially large implications not only regionally but also for the global climate. (p. 442)

Gascard *et al.* (2017) point in the same direction, stating that “a fundamental element of climate change in the Arctic is the rapid decline in sea ice cover, and its thickness, in particular since the 2000s” (p. S355). Projections of future scenarios based

on historical series provide an even grimmer view: “a drastic Arctic sea ice volume loss of about 75% at the end of the summer season (September)” has been identified when compared to 35 years ago (Gascard *et al.*, 2017, p. S367), a reduction not only of sea ice extent, but also sea ice thickness, which means the current ice in the Arctic covers less area, and it is not thick enough to resist throughout the summer seasons (Gascard *et al.*, 2017). This change in the natural dynamics of sea ice has affected the perception that polar territorial states have in relation to the Arctic region, renewing the vision of the region as a frontier of economic expansion, a new naval route of global integration (Zhou *et al.*, 2021), and a new region of geopolitical tension due to the expansion of regional navigability conditions, which allows wider operability on the surface, and on submarine environments, for prolonged periods, in the summer and the winter. This is what Wang *et al.* (2016, pp. 127-128) emphasize: “Global climate change is melting the Arctic sea ice and will improve the navigability of the Arctic passages”. The opening of the Arctic route, on the one hand, might facilitate the exploration and development of Arctic resources and a faster, cheaper route connecting Asia-Pacific to the Americas and Europe. On the other hand, it may “ignite a worldwide ‘Arctic resource war’” (Wang *et al.*, 2016, p. 129).

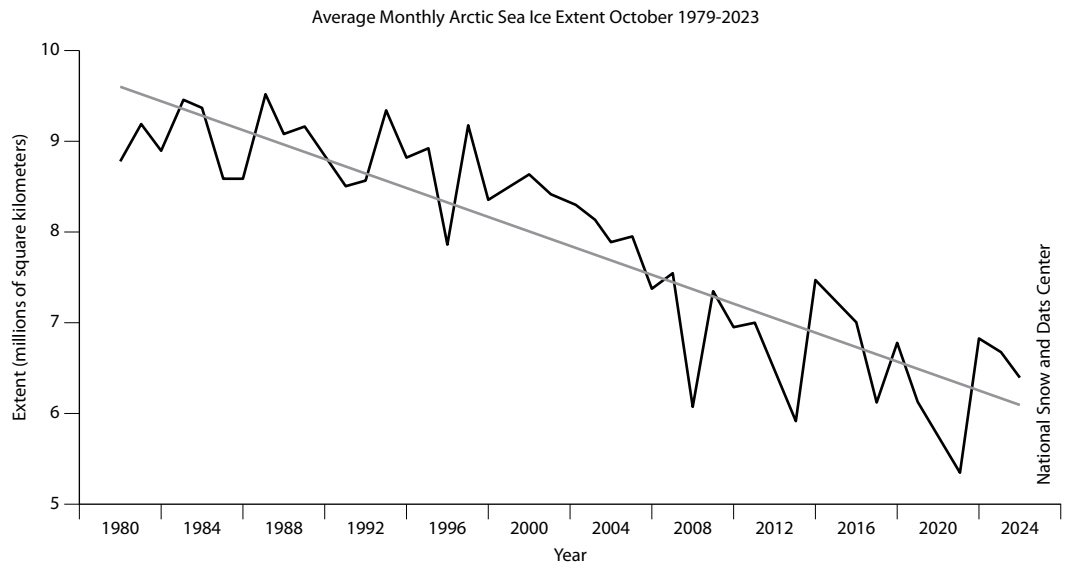
The renewed perception of wider operability affects the state’s views in two ways: one, positive, regarding the economic benefits to be explored underneath the melting ice; and other, negative, due to

the possibility of surface operability for prolonged periods of time by creating a perception of strategic vulnerability, as a navigable and operational sea makes room for the incursion of expeditionary forces in amphibious landings transported by naval means. A more open Arctic Ocean means that it is not only navigable but above all maneuverable, two fundamental elements for naval operations in the military field (MacDonald, 2022), and can be open to navigation of open-water ships by mid-century (Chen *et al.*, 2021). Aside from the trend downwards of the sea ice extent for all months (Serreze, 2018), there is also a trend of reduced ice thickness: “the Arctic mean ice thickness declined from 3.46 meters in 1980 to 1.89 meters in 2008, a total

decline of 1.75 meters” (Stroeve & Meier, 2012, p. 446).

Historical series measured by NASA and the National Snow and Ice Data Center (figure 1) have shown that the minimum extent of sea ice in the Arctic in 1980 was near 9 million km<sup>2</sup> for the month of October. The same dataset shows that, in 2020, this extent was reduced to 5.4 million km<sup>2</sup>, a record low with an average loss of 9.5% of ice coverage per decade. The total loss between 1980 and 2020 was around 3.6 million km<sup>2</sup> and equals the size of the land territories of India and France together. In spite of the sharp recovery shown in 2021 and 2022 (mostly due the Covid-19 Pandemics, which halted emissions for a period of time), trends are still sharply downward. The best-case scenario

**FIGURE 1. AVERAGE MONTHLY ARCTIC SEA ICE EXTENT**



Note. This figure demonstrates the downward trend in average sea ice extent for the month of October, between 1979 and 2023. Despite the ups and downs, the trend is sharply downwards, which indicates the loss of massive territories of sea ice in the Arctic

Source: National Snow and Ice Data Center, <https://nsidc.org/arcticseaicenews/>

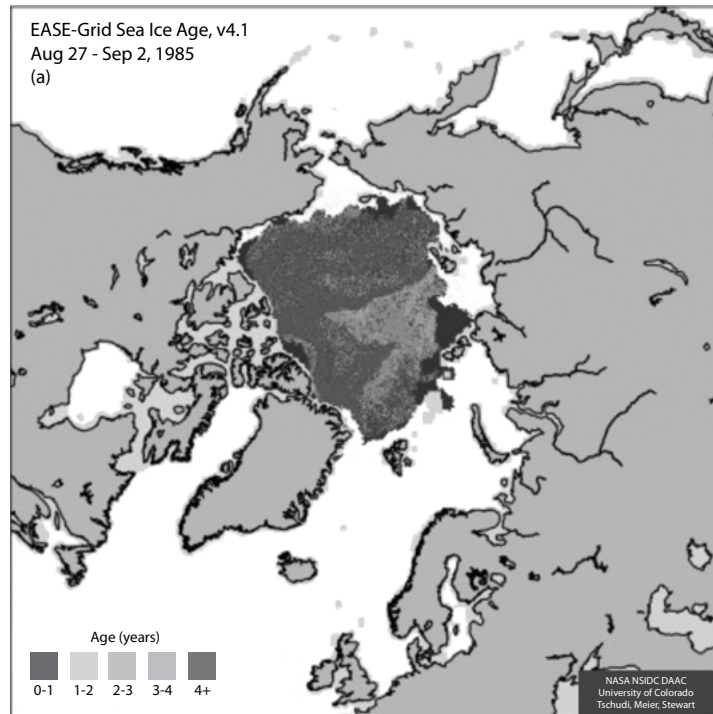
for 2024 is that the World will have lost an entire territory of India in Arctic sea ice.

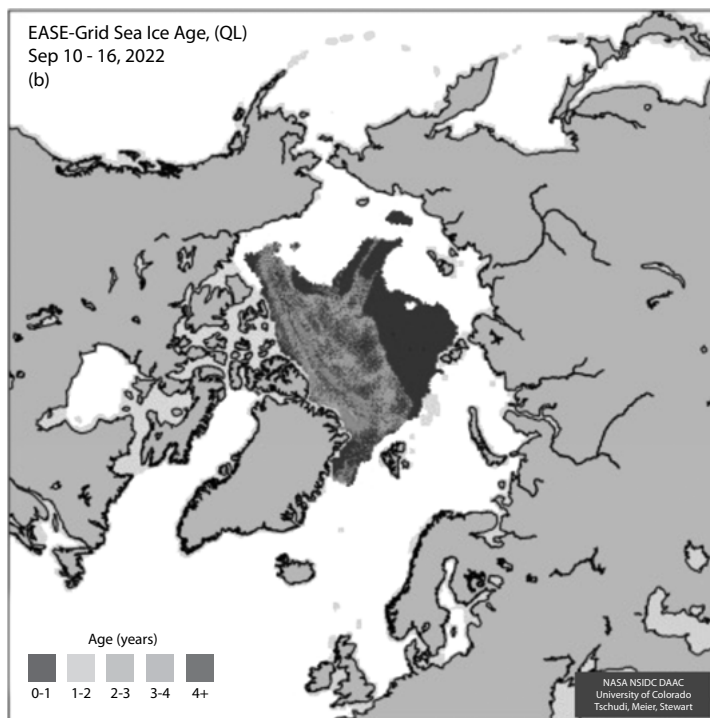
As dramatic as it looks like, there are currently regions in the Arctic that, in the late summer and early autumn, are completely ice-free and highly navigable. This trend could be extended to winter times (Tepes *et al.*, 2021; Zhou *et al.*, 2022). The harsh reduction of the minimum extent of Arctic sea ice between 1980 and 2020, occurred mostly on the coast of Russia due to geographic reasons: I) external oceanic circulation, or the flows of sea currents coming from the Atlantic and the Pacific into the Arctic; II) internal oceanic circulation, or the current flows typical of the Arctic

polar ocean; III) issues related to salinity and freshwater replenishment in the Arctic originating from drainage basins; IV) wind trail, which pushes the ice blocks to the coast of Canada and Greenland, facilitating the compaction of first-year ice through the rafting process and multi-year ice through the ridding process (Serreze & Barry, 2014). Notwithstanding, and regardless of its natural origin, this may help to understand the reason for Moscow's change in geopolitical stance in the region, and its altered perceptions: less ice, and thinner ice, makes it more vulnerable.

As seen in figure 2, the predominance of sea ice during the Summer months has

**FIGURE 2. SEA ICE AGE, COMPARISON BETWEEN AUG/SEP 1985 AND SEPT 2022**





Note. This figure shows the sea ice age in the months of minimum extent, comparing the years of 1985 and 2022. It can be seen that multi-year ice (thicker) has sharply decreased, and it is virtually nonexistent along the Russian coast. Additionally, it can be seen from the image that Russia has no even ice cover during the summer months in most of its territorial sea; the ice it has is 0-1 year ice (also known as first-year ice, or FYI) in the surrounding of its Arctic Islands, and in two points near Siberia.

Source: Meier *et al.* (2022). Sea Ice. <https://doi.org/10.25923/xyp2-vz45>

been harshly reduced between the 1980s and the 2020s. These data unequivocally demonstrate that climate change has profoundly affected the Arctic region at a faster pace when compared to other regions of the planet – and the Russian Arctic more than other areas of the Arctic, with the possibility of greater navigability (Zhou *et al.*, 2022). The broader consequence of this process is the widening of the security dilemma, and a deep change in Arctic naval geopolitics, with foreseeable challenges to the regional stability, for the local maritime

regulations, and more importantly to the United Nations Convention on the Law of the Seas.

### **CLIMATE CHANGE, MARITIME DELIMITATION, AND THE CHALLENGES TO UNCLOS**

Russian current expansionism in the Arctic, notwithstanding the regional economic potential, has had a more military focus (Pincus, 2020a) now motivated by a new phenomenon: climate change (Zysk, 2020).

This new reality has wide influence over the two Russian Federation Strategies for the Arctic, published in 2013 and 2020, and amended in 2023, which are responses to state competition and increased geopolitical tension in the Arctic region (Zysk, 2020; Zellen, 2009).

As the region's militarization process grows from the sides of all Arctic countries (Zysk, 2020), Russia – heavily dependent on commodities exports – increases its presence in the region due to the need to protect Arctic natural resources (Zellen, 2009), which accounts for more than 20% of Russian GDP (Zysk, 2020). It is important to highlight that the region's underwater mineral wealth (Ebinger & Zambetakis, 2009) makes the region a vital economic asset. The fact that the Arctic is, for Russia, not only a zone for economic expansion, but also for state survival and identity (Zysk, 2020; Zellen, 2009) is promoting a natural tension within Russian politics, not only between the two combined axes of internal and external policies, but a more complex contraposition of a polar economic growth plan led by state-capitalism and the long-lasting, Soviet-Era defensive strategic-military mindset inherited by the Russian Federation, or a choice between “economic optimism and security pessimism” (Zysk, 2020).

When considering that melting ice due to climate change (Zhou *et al.*, 2022; Wang *et al.*, 2016) is transforming the Arctic into yet another active frontier for Russia geopolitics get even further complicated under a scenario of a fast-moving new Arctic

race, which has been a pressing issue within Russian politics: the race to exploit economic resources in the High North moved from a competitive economic issue, passing through a military buildup, to a questioning of long-established International Law regulation for maritime affairs: the United Nations Convention on the Law of the Sea (UNCLOS). This Convention, signed in 1982, is a general regulation of maritime affairs according to the International Law, and define, among other things, the rules applied to definition of territorial sea, contiguous zone, and the exclusive economic zone. It is important to highlight that 7 of the 8 Arctic states are part of the Convention and have ratified it, all but the United States.

Article 3 of the UNCLOS establishes a limit of 12 nautical miles for a state's territorial sea, which shall be measured from baseline (the water line in low tide). This is a first issue that comes up when discussing climate change in the Arctic: melting sea ice is helping in the rising sea levels, which will affect the low tide line and, consequently, the starting point from territorial sea measurement. However, the biggest problem lies in the reading of Article 76 of the UNCLOS, which defines the continental shelf and provides rules for its measurement. Continental shelf is an extension of the landmass of a coastal state which advances under the sea up to 200 nautical miles, also measured through the (changing) baseline. This is a rule which allows a state to claim exclusivity over the resources in this area, despite not being part of its territorial sea (Pincus, 2020a). This is the major argument Russia

has been using in its recent claims before the Commission on the Limits of the Continental Shelf (Todorov, 2023), and has been subject to a decision by the International Court of Justice in 2023, in the case *Nicaragua vs. Colombia*, in which the court has declared the interrelation between the international regime regulating the Economic Exclusive Zone (EEZ) and the rules concerning the limits of the continental shelf, but stated that delimitation is different for each one: while the EEZ and its 200nm continental shelf is measured from the baseline—therefore subject to what Árnadóttir (2022) calls *Coastal Instability* which includes rising sea levels – the *outer* continental shelf (which could increase a state's entitlement to EEZ beyond the 200nm) is not related to the baseline, but to a measurement of the prolongation of the shelf from the coastal state's land (ICJ, 2023), therefore not being affected by climate change. This legal reasoning has been used – and recognized – in the Russian case, in favor of Russia, and may influence the other pending maritime cases? disputed still active in the Arctic, some between Russia and Western states (including parts of the overlapping claims over the Lomonosov and Mendeleev still pending a decision, which involve Russia, Canada, Denmark, the US and Norway), other between Western states (Beaufort Sea and the Northwest Passage, between the US and Canada; the Eirik Ridge between Denmark and Canada), and two specific ones between Russia and Denmark over fisheries on the Barents Sea and over the status of Svalbard under the 1920 Treaty.

Regarding the maritime territorial delimitation of the Arctic, it is fundamental to consider that a great part of it has been settled by the nations in the past. However, the economic potential created by the looming climate crisis has revived the disputes between the Arctic nations over the application of the continental shelf principle in mapping the UNCLOS-assured 200 miles of exclusive economic zone (EEZ). This is a geopolitical complication factor for two major problems: first, Russia has in recent years filed a number of claims before the United Nations Commission on the Limits of the Continental Shelf (CLCS) to recognize Russian rights over three underwater geological marks – most specifically the mineral-rich Lomonosov Ridge, and parts of the Canadian Basin—arguing it is an extension of Russian continental shelf, and in 2023 the CLCS has partially recognized those claims to be valid (Todorov, 2023); and second, rising sea levels caused by melting ice might affect the baseline demarcation, which the UNCLOS uses as criteria for maritime territorial delimitation, making legal discussions over territorial sea and EEZ more complicated. This has also the effect of causing tensions within the Western bloc, as maritime disputes in the region are not exclusive between Western nations on the one side and Russia on the other, with some disputes opposing two or more Western nations.

Since the Arctic has become an “emerging area of global economic activity and a highly militarized and strategic region” (Pincus, 2020a, p. 40), UNCLOS has also been challenged on the issue of freedom of

navigation, a basilar principle of the Convention. This is because Russia used to have power over Arctic navigation since it has a broad fleet of nuclear-powered icebreakers, which allowed it to control the navigation through a soft-power way (linked to maritime security and navigation rules within the Polar Code). Notwithstanding, many Arctic countries have started increasing its own icebreaker fleet, not to rely on an untrustworthy Russia. Consequently, Russia has adopted a more aggressive position in the Arctic, claiming to be a defensive measure, despite this concept being blurred by the shady “active defense” strategy which is historically present in Russia since imperial and soviet times (Zysk, 2020). And there is a natural risk – small, but possible – of “accidental” escalation (Zysk, 2020), especially considering that geopolitics is a game of perception, and this perception has been affected by recent Russian moves in Ukraine, the Black Sea, and the Mediterranean.

## CONCLUSION

This article examined how the climate change process has been affecting the naval geopolitical relationship in the Arctic and creating challenges to the United Nations Convention on the Law of the Seas (UNCLOS). These challenges involve maritime claims Russia has made based on the Convention, using the continental shelf as a strong legal argument to grant UN recognition of its right to control more territory in the Arctic. Our findings reinforce: 1. That the Arctic has a characteristic of

natural and geopolitical territory, and in the case of Russia of a national identity region; 2. that climate change has been affecting the Arctic more than any other region on the planet; 3. That the melting sea ice in the Arctic has been opening new areas for economic exploration and facilitating navigability, and tends to open more in the future, the more the Arctic Amplification and climate change advances; and 4. That this new scenario is, at the same time, creating future points of conflict, especially ones opposing Russia to Western States. Finally, we can conclude that since the melting ice has been altering the geographic organization of the Arctic, it has also affected Russian geopolitical perceptions, and generated potential challenges to UNCLOS in the near future, with the possibility of escalation.

## REFERENCES

- Anderson, A. (2009). *After the ice: Life, death, and geopolitics in the New Arctic*. Smithsonian.
- Antrim, C. (2011). The Russian Arctic in the twenty-first century. In Kraska, J. (Ed.). *Arctic security in an age of climate change*. Cambridge University Press.
- Árnadóttir, S. (2022). *Climate change and maritime boundaries: Legal consequences of sea level rise*. Cambridge University Press.
- Baikalov, A. V. (1932). The conquest and colonisation of Siberia. *The Slavonic and East European Review*, 10(30), 557-571.
- Biresselioglu, M. E., Demir, M. H., Solak, B., Kayaçan, A., & Altinci, S. (2020). Investigating the trends in arctic research: The increasing role of social sciences and humanities. *Science of*

- the Total Environment*, 729(139027). <https://doi.org/10.1016/j.scitotenv.2020.139027>
- Bruno, A. (2016) *The nature of Soviet power: An Arctic environmental history*. Cambridge University Press.
- Burke, R. P. (2022). *The Polar pivot: Great power competition in the Arctic and Antarctica*. Lynne Rienner Publishers.
- Bushkovich, P. (2012). *A concise history of Russia*. Cambridge University Press.
- Chalecki, E. L. (2007). He who would rule: Climate change in the Arctic and its implications for U.S. *National Security*. *Journal of Public & International Affairs*, 18, 204-222.
- Chen, J., Kang, S., Du, W., Guo, J., Xu, M., Zhang, Y., ... Zhang, W. (2021). Perspectives on future sea ice and navigability in the Arctic. *The Cryosphere*, 15, 5473-5482. <https://doi.org/10.5194/tc-15-5473-2021>
- Choudhary, S., Saalim, S. M., & Khare, N. (2021). Climate change over the Arctic: Impacts and assessment. In *Khare, N. Understanding present and past Arctic environments: An Integrated approach from climate change perspectives*. Elsevier.
- Chylek, P., Folland, C., Klett, J. D., Wang, M., Hengartner, N., Lesins, G., & Dubey, M. K. (2022). Annual mean Arctic amplification 1970-2020: Observed and simulated by CMIP6 climate models. *Geophysical Research Letters*, 49. <https://doi.org/10.1029/2022GL099371>
- Ebinger, C. K., & Zambetakis, E. (2009). The geopolitics of Arctic melt. *International Affairs*, 85(6), 1215-1232.
- Gascard, J., Riemann-Campe, K., Gerdes, R., Schyberg, H., Randriamampianina, R., Karcher, M., ... Rafizadeh, M. (2017). Future sea ice conditions and weather forecasts in the Arctic: Implications for Arctic shipping. *Ambio Journal of Environment and Society*, 43(Suppl. 3), S355-S367. <https://doi.org/10.1007/s13280-017-0951-5>
- Gilpin, R. (2010) *War and change in world politics*. Cambridge University Press.
- Hogg J., Fonoberova M., & Mezić I. (2020). Exponentially decaying modes and long-term prediction of sea ice concentration using Koopman mode decomposition. *Nature Scientific Reports*. 10(1),16313. <https://doi.org/10.1038/s41598-020-73211-z>
- Hønneland, G. (2016). *Russia and the Arctic: Environment, identity and foreign policy*. I.B.Taurius.
- Hosking, G. (2011). *Russia and the Russians: A history*. Belknap Press.
- International Court of Justice (2023). *Question of the delimitation of the continental shelf between Nicaragua and Colombia beyond 200 nautical miles from the Nicaraguan coast* (Nicaragua v. Colombia). <https://www.icj-cij.org/case/154>
- Isaksen, I., Nordli, Ø. Ivanov, B. ... & Karandashva, T. (2022) Exceptional warming over the Barents area. *Scientific Reports*, 12(9731). <https://doi.org/10.1038/s41598-022-13568-5>
- Jin, Y., Chen, M., Yan, H., Wang, T., & Yang, J. (2023). Sea level variation in the Arctic Ocean since 1979 based on ORAS5 data. *Frontiers in Marine Science*. <https://doi.org/10.3389/fmars.2023.1197456>
- Laruelle, M. (2014). *Russia's Arctic strategies and the future of the far north*. M. E. Sharpe.
- MacDonald, A. P. (2022). Becoming an "Arctic-Capable" navy: Not just the Arctic and offshore patrol ship. *Canadian Military Journal*, 22(2), 7-16. <https://www.journal.forces.gc.ca/PDFs/cmj222Ep7.pdf>



- McCannon, J. (2012). *A history of the Arctic: Nature, exploration and exploitation*. Reaktion Books.
- McCrystall, M. R., Stroeve, J., Serreze, M. C., Forbes, B. C., & Screen, J. A. (2021). New climate models reveal faster and larger increases in Arctic precipitation than previously projected. *Nature Communications* 12(6765). <https://doi.org/10.1038/s41467-021-27031-y>
- Meier, W., Petty, A., Hendricks, S., Perovich, D., Farrell, S. ... & Tian-Kunze, X. (2022). Sea Ice. *NOAA technical report OAR ARC 22-06*. <https://doi.org/10.25923/xyp2-vz45>
- Pincus, R. (2020a). Three-way power dynamics in the Arctic. *Strategic Studies Quarterly*, 14(1), 40-63. <https://www.jstor.org/stable/26891883>
- Pincus, R. (2020b). Towards a new Arctic: Changing strategic geography in the GIUK Gap. *The RUSI Journal*, 165(3), 50-58. <https://doi.org/10.1080/03071847.2020.1769496>
- Rantanen, M., Karpechko, A. Y., Lipponen, A., Nordling, K., Hyvärinen, O., Ruosteenoja, K., ... Laaksonen, A. (2022). The Arctic has warmed nearly four times faster than the globe since 1979. *Communications Earth and Environment*, 3(168). <https://doi.org/10.1038/s43247-022-00498-3>
- Serreze M. C., & Meier W. N. (2019). The Arctic's sea ice cover: Trends, variability, predictability, and comparisons to the Antarctic. *Annals of the New York Academy of Sciences*, 1436(1), 36-53. <https://doi.org/10.1111/nyas.13856>. Epub
- Serreze, M. C. (2018). *Brave New Arctic: The untold story of the melting north*. Princeton University Press.
- Serreze, M. C., Stroeve, J., Barrett, A. P. & Boisvert, L. N. (2016). Summer atmospheric circulation anomalies over the Arctic Ocean and their influences on September sea ice extent: A cautionary tale. *Journal of Geophysical Research*, 121. <https://doi.org/10.1002/2016JD025161>.
- Serreze, M. C., Crawford, A., Stroeve, J. C., Barrett, A. P. and Woodgate, R. A. (2016). Variability, trends and predictability of seasonal sea ice retreat and advance in the Chukchi Sea. *Journal of Geophysical Research*, 121, <https://doi.org/10.1002/2016JC019177>.
- Serreze, M. C., Barry, R. G. (2014). *The Arctic climate system*. Cambridge University Press.
- Serreze M. C., Barry R. G. (2011). Processes and impacts of Arctic amplification: A research synthesis. *Global Planetary Change* 77(1-2), 85-96. <https://doi.org/10.1016/j.gloplacha.2011.03.004>
- Strawa, A. W., Latshaw, G., Farkas, S., Russell, P., & Zornetzer, S. (2020). Arctic ice loss threatens national security: A path forward. *Orbis*, 64(4), 622-636. <https://doi.org/10.1016/j.orbis.2020.08.010>
- Stroeve, J., Meier, W. (2011). Arctic Sea Ice Decline. In Liu, G. (Ed.). *Greenhouse Gases: emission, measurement and management*. Intech Open.
- Tepes, P., Nienow, P., Gourmelen, N. (2021). Accelerating ice mass loss across Arctic Russia in response to atmospheric warming, sea ice decline, and Atlantification of the Eurasian Arctic shelf seas. *Journal of Geophysical Research: Earth Surface*, 126(7). <https://doi.org/10.1029/2021JF006068>
- Tillman, H., Yang, J., Nielsson, E. T. (2018). The Polar silk road: China's new frontier of international cooperation. *China Quarterly of International Strategic Studies*, 4(3), 345-362.
- Todorov, A. (2023). *Russia's Arctic shelf bid and the commission on the limits of the continental shelf, explained*. Belfer Center for Science

- and International Affairs, Harvard Kennedy School. <https://www.belfercenter.org/publication/russias-arctic-shelf-bid-and-commission-limits-continental-shelf-explained>
- Wang, C., Liu, D., Xu, M., Yu, Y., Li, X., Gao, J., & Xing, W. (2016). The sustainable relationship between navigation of Arctic passages, Arctic resources, and the environment. *Journal of Sustainable Development*, 9(2), 127-136. <http://dx.doi.org/10.5539/jsd.v9n2p127>
- Wu, B., & Li, Z. (2021). Possible impacts of anomalous Arctic sea ice melting on summer atmospheres. *International Journal of Climatology*, 42, 1818-1827. <https://doi.org/10.1002/joc.7337>
- Zellen, B. S. (2009). *Arctic doom, Arctic boom: Geopolitics of climate change in the Arctic*. ABC Clio.
- Zhou, X., Wang, B., Huang, F. (2022). Evaluating sea ice thickness simulation is critical for projecting a summer ice-free Arctic Ocean. *Environmental Research Letters*, 17(114033). <https://doi.org/10.1088/1748-9326/ac9d4d>
- Zysk, K. (2020). *Russia's military build-up in the Arctic: To what end?* Center for Naval Analyses, Norwegian Institute for Defence Studies. <https://www.cna.org/reports/2020/09/IOP-2020-U-027998-Final.pdf>