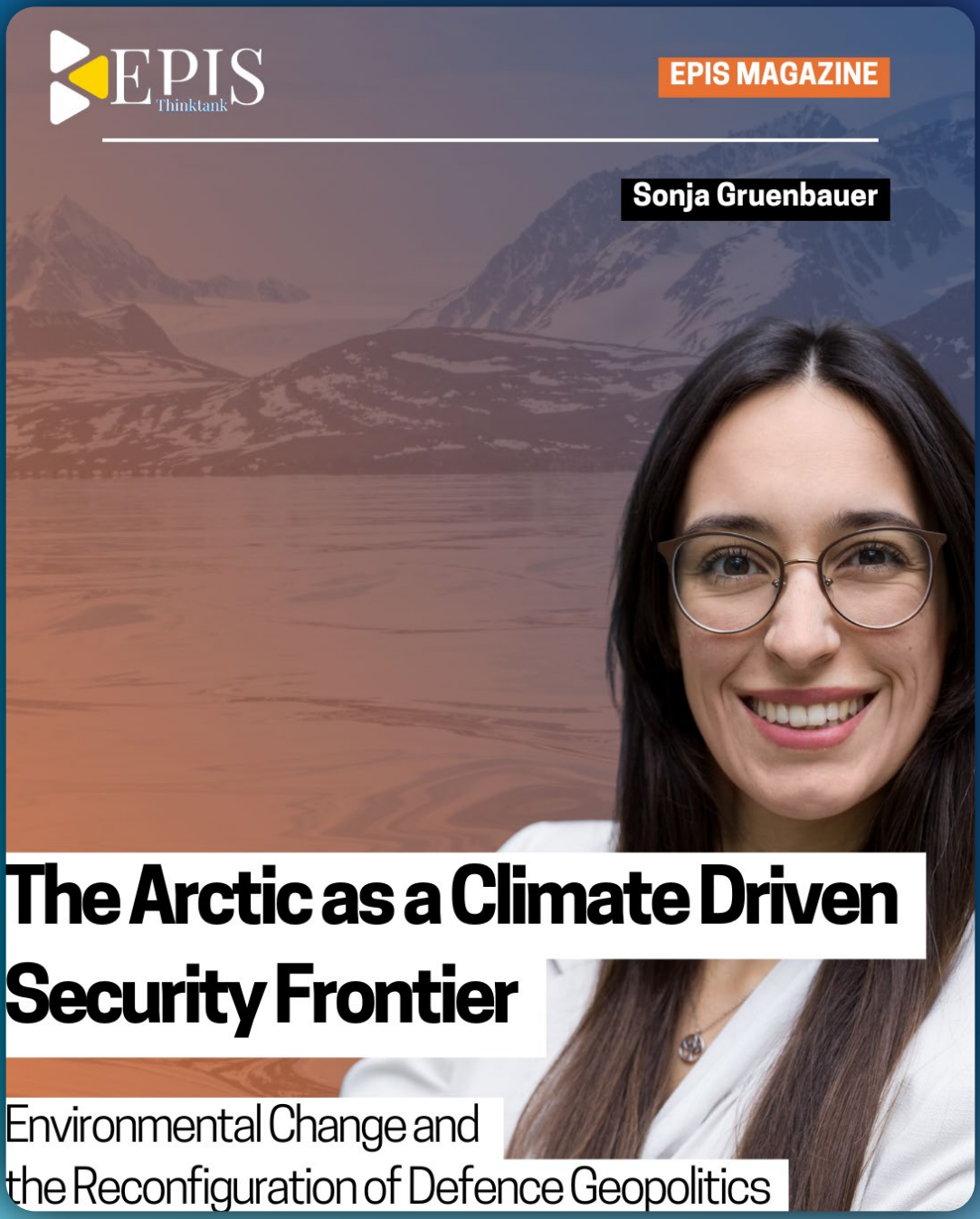

About the Article

The Arctic is no longer a remote periphery. Sonja Grünbauer argues that climate change is transforming the region into a strategic frontier where environmental disruption, military planning, and great-power competition increasingly intersect. Moving beyond alarmism and simple "resource rush" narratives, the article shows how new operational realities, infrastructure pressures, and deterrence concerns are reshaping security thinking in the High North

About the Author

Sonja Grünbauer is a motivated young professional with a background in International Relations and Management. She studied abroad in Spain and the Netherlands, shaping her interest in international crisis response. Her focus is on Civil-Military Cooperation (CIMIC) and Disaster Management in Germany. At CCOE, she supports research and events. She aims to work in national crisis management and grow as a consultant in CIMIC to help build a more resilient society.

1. Introduction: Climate Change and Strategic Reordering in the Arctic

The Arctic is undergoing rapid environmental transformation, warming at a rate significantly above the global average. Rising temperatures, declining sea ice extent, and thawing permafrost are reshaping the physical characteristics of the region (NOAA National Center for Environmental Information, 2025). These changes are not merely ecological. They are strategic. As sea ice retreats and seasonal accessibility increases, the Arctic is shifting from a peripheral buffer zone to an emerging operating domain within great-power competition.Climate change does not directly cause conflict in the High North. Rather, it functions as a structural driver that alters accessibility, infrastructure reliability, and the capacity to conduct operations. Maritime corridors such as the Northern Sea Route and the Northwest Passage are becoming more navigable for longer periods of the year. At the same time, thawing permafrost undermines existing military infrastructure, early warning systems, and logistical networks. Environmental transformation simultaneously opens space and destabilizes the material foundations of presence and deterrence. The Arctic is therefore no longer insulated from broader geopolitical rivalry; it is increasingly embedded within it. This article argues that climate change is transforming the Arctic from a peripheral buffer into a contested operating domain. As ice retreat expands seasonal access while permafrost degradation and weather volatility undermine fixed installations, deterrence in the High North becomes increasingly dependent on resilient basing, mobility, and alliance coordination. For NATO and European actors, the strategic challenge is therefore not primarily resource competition or symbolic presence, but the integration of climate-driven environmental change into force posture and long-term defence planning in a region that is becoming at once more open and more unstable.

2. From Geographic Periphery to Strategic Domain

From a security perspective, the Arctic increasingly operates as a maritime and aerospace domain encompassing sea lines of communication, undersea infrastructure, airspace, and early-warning systems (Vidhammer Berge & Bergmann, 2024). Environmental constraints historically limited sustained military and commercial activity in the Arctic, reinforcing its peripheral status. Climate change weakens these constraints. As ice conditions become more predictable on a seasonal basis and infrastructure viability increases (Cotta, 2024), the Arctic's role within national and alliance-level defence planning expands. This shift reflects a reordering of strategic geography rather than a sudden militarization driven by political intent alone.

Figure 1: Polar Shipping Route, Source: https://transportgeography.org/wp-content/uploads/Map-Polar-Routes-Simplified-1.pdf

3. Climate Change as a Structural Driver of Securitization

The Arctic's environmental transformation is well-documented. Satellite observations show a long-term decline in summer sea ice extent exceeding forty percent since the late 1970s, alongside rising ocean temperatures and accelerating permafrost degradation (Arctic Monitoring and Assessment Programme). These changes first affect accessibility. Reduced ice cover extends seasonal navigation along routes such as the Northern Sea Route (Figure 1), lowering physical barriers to maritime transit and expanding windows for commercial and naval activity. Thawing permafrost undermines runways, roads, radar installations, and fixed basing infrastructure. Ocean temperature shifts influence sonar performance and undersea navigation, while increased weather volatility complicates planning and logistics. The environment becomes not only more open, but less predictable (Trochim & Schuur). As accessibility and operational density increase, vulnerability exposure grows. Dual-use ports, satellite ground stations, energy infrastructure, and communication cables become more central to regional connectivity and more susceptible to disruption. Greater traffic and sustained presence raise the probability of accidents, congestion, and strategic interference. Environmental change thus simultaneously expands opportunity and amplifies fragility.These material shifts contribute to securitisation by transforming environmental change into strategic exposure. What was once a remote and insulated region becomes a space where activity, vulnerability, and strategic interaction intensify, prompting adjustments in threat perception and defence planning.

1951 Defence of Greenland Agreement: a pact between U.S. and Denmark, letting the U.S. keep and operate military bases in Greenland for mutual defence while respecting Danish sovereignty.

4. The Erosion of Arctic Exceptionalism

For much of the post–Cold War period, the Arctic was conceptualised through the framework of Arctic exceptionalism, portraying the region as distinct from broader geopolitical competition. This model emphasised functional cooperation, particularly through institutions such as the Arctic Council, which focused on scientific research and environmental governance while deliberately excluding military security from its mandate (Heininen, 2022). Limited activity, persistent environmental barriers, and shared interest in low tension kept the region stable (Corell, et al., 2019). Since 2014, this exceptionalism has eroded. Russia has expanded Arctic military infrastructure, while NATO has increased exercises, surveillance, and integration (2024 Arctic Strategy, 2024). Accessibility changes have made the region strategically significant, forcing the Arctic back into deterrence planning. The rupture accelerated after 2022. Following Russia's full-scale invasion of Ukraine, Arctic Council cooperation with Moscow was suspended. The Council's technocratic work had depended on routine interaction and political trust, both now weakened. An institutional architecture designed for a depoliticised Arctic is operating under sustained strategic confrontation, visible in heightened threat perceptions (Figure 2) and worst-case planning along NATO's northern (Leclerc, 2024). Simultaneously, the material environment that once constrained activity is transforming. Longer navigation seasons, expanding maritime traffic, and dual-use infrastructure reduce the Arctic's insulation from global competition. Environmental barriers that previously dampened military and commercial incentives are receding. As accessibility increases, so does the density of strategic interaction. These developments do not represent an abrupt breakdown of cooperation but rather a growing mismatch between environmental change and institutional adaptation. Arctic exceptionalism is therefore eroding on three interconnected levels: materially, as climate change lowers barriers to access; institutionally, as cross-bloc cooperation narrows; and strategically, as the region is reintegrated into deterrence logic. The Arctic is no longer buffered by ice, distance, or diplomatic

compartmentalisation. It is emerging as a contested operating domain within Euro-Atlantic security.

4. Strategic Actors and Defence Responses

States respond differently to the same structural transformation. Expanded accessibility creates opportunities, while infrastructure fragility and exposure create constraints. Russia has heavily militarised its Arctic coastline, investing in air bases, missile systems, and ice-capable naval assets (Bender, 2015). Climate change enhances the operational utility of these capabilities further by extending navigable periods and improving logistical reach. For Russia, environmental transformation reinforces territorial depth and control, particularly along the Northern Sea Route and the Kola Peninsula. Yet this advantage is offset by infrastructure vulnerability. Moscow is therefore both exploiting increased accessibility and confronting the fragility of its fixed basing model. The United States occupies a different structural position. As an Arctic state through Alaska and as NATO's principal military power, its Arctic engagement centres on homeland defence, early warning, and deterrence credibility. Unlike Russia, Washington is not consolidating territorial control along a continuous Arctic coastline. Its priority is maintaining strategic mobility and cross-domain integration. Climate change is treated primarily as an operational constraint that affects basing resilience, sustainment, and domain awareness rather than as an opportunity for expansion. U.S. adaptation thus focuses on capability reliability in a volatile environment (2024 Arctic Strategy, 2024). NATO's adaptation reflects the final stage of the mechanism: as vulnerability exposure increases, alliance coordination and posture adjustment become central. The accession of Finland (2023) and Sweden (2024) integrates the High North more directly into collective defence planning, while emphasizing readiness, surveillance, and protection of

Figure 2 Arctic Security Dynamics

critical infrastructure (Regional Perspectives Report on the Arctic, 2023). Climate considerations are incorporated insofar as they affect operational reliability, basing, and sustainment (NATO HQ, 2023). As another key player, the European Union has also identified the Arctic as a zone of growing strategic competition. Parliamentary assessments highlight the intersection of climate change, militarization, and geopolitical rivalry, calling for closer alignment between security, environmental, and foreign policy instruments (KobeŠĆak SmodiŠ & Almqvist, 2025). China's Arctic engagement adds further complexity. While framed primarily around scientific research and commercial shipping, China's sustained presence reflects long-term strategic interest enabled by environmental accessibility (Devyatkin, 2025).

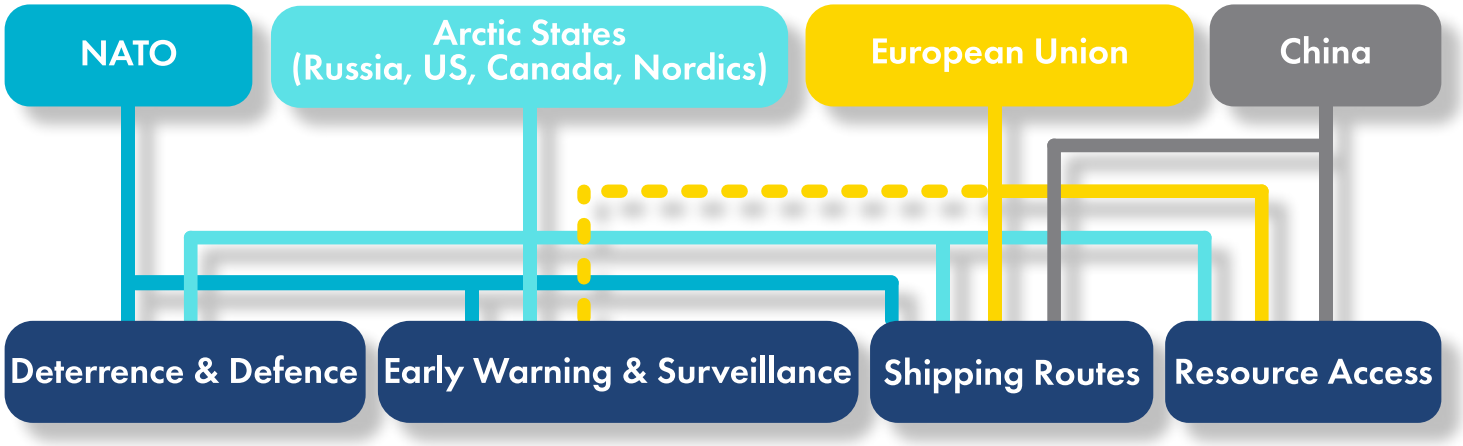

Figure 3 Actors-Interest-Mapping (Author's own illustration)

Together, these responses illustrate how climate-driven structural change reshapes strategic calculation without producing uniform militarisation (Figure 3).

5. Implications for European and Trans-Atlantic Security

Climate-driven changes in the Arctic affect Europe far beyond the High North. Accessibility is increasing: longer ice-free periods along the Northern Sea Route enable more frequent shipping and naval transit. This new accessibility allows commercial and military traffic to operate for extended periods (Thompson, 2025). At the same time, it exposes vulnerabilities: undersea cables, pipelines, and critical infrastructure face higher risks from congestion, accidents, or strategic disruption. These physical and operational shifts are eshaping defence posture. Ice-capable vessels, climate-resilient infrastructure, and adaptive logistics have moved from niche Arctic assets to core enablers of deterrence, situational awareness, and crisis management. Denmark's expanded defence investment in Greenland and surrounding maritime areas illustrates this adaptation (France 24, 2025). NATO and European planners now treat environmental volatility as a persistent operational condition, adjusting basing, mobility, and readiness accordingly. Alliance-level cooperation reflects the same causal logic. Industrial and operational partnerships enhance feasibility and reduce vulnerabilities. Finland's agreement to construct icebreakers for the U.S. Coast Guard (delivery 2028) increases operational reach and patrol reliability in Arctic waters (Jeppesen, 2025). Bilateral and minilateral collaborations - such as UK–Norway exercises and Royal Marines deployments - embed Arctic security into NATO's collective posture and improve operational predictability in a more accessible but riskier environment (Ministery of Defence, 2025). At the same time, increased Arctic exposure places new strains on alliance cohesion. Greenland's renewed strategic significance raises questions of sovereignty, access, and governance. The U.S. military presence, governed by the 1951 Defence of Greenland Agreement, allows operations while preserving Danish sovereignty (Department of State Publication, 2008). Recent U.S. statements questioning Greenland's strategic status have prompted coordinated diplomatic responses, with France, Germany, Italy, Poland, Spain, and the United Kingdom reaffirming support for Denmark (Élysée Palace, 2026). Here, environmental change amplifies strategic stakes, forcing allies to adapt posture, policy, and governance in tandem.

6. Policy Adaptation in a Climate-Driven Security Environment

Effective policy adaptation in the Arctic security environment requires a shift from reactive adjustment toward structurally informed security planning. As environmental change alters accessibility, infrastructure viability, and operational conditions, defence institutions can no longer treat climate effects as exogenous shocks. Instead, climate projections must be integrated into long-term strategic assessments, shaping basing decisions, procurement cycles, and force posture planning. This is particularly relevant in regions where infrastructure longevity, logistical reliability, and readiness are directly conditioned by

thawing permafrost, changing ice regimes, and increasing weather volatility. From a defence planning perspective, adaptation increasingly hinges on investment strategies that prioritise dual-use and climate-resilient infrastructure. Assets capable of supporting both civilian and military activity - such as ports, airfields, and communication systems - enhance deterrence and crisis response while mitigating escalation risks associated with rising Arctic activity. By embedding resilience into infrastructure development, states can reduce vulnerability without framing the Arctic exclusively as a military theatre. Such an approach aligns security objectives with broader governance and sustainability considerations, reinforcing stability rather than competition. Governance mechanisms must evolve in parallel with capability development. As maritime traffic and operational density increase, the absence of robust incident-prevention frameworks becomes a security liability rather than a regulatory gap. Confidence-building measures, transparency arrangements, and shared operational norms complement deterrence by reducing uncertainty and the risk of misperception. In this sense, governance functions not as an alternative to security policy but as an enabling condition for effective deterrence and crisis management in a more accessible and contested Arctic. Hybrid threats further complicate this environment by blurring the boundaries between military, economic, and civil security. The protection of critical infrastructure, including undersea cables, satellite systems, and data transmission nodes, cannot be addressed through national measures alone, given the transnational nature of both vulnerabilities and dependencies. Cooperative approaches that emphasise shared exposure and collective resilience are therefore essential, particularly within alliance frameworks such as NATO and through coordination with civilian authorities and private operators. For non-Arctic states, adaptation does not require territorial presence but strategic awareness. Developing Arctic-informed security strategies enables these states to anticipate indirect exposure through trade, energy, and communication networks, and to contribute meaningfully to alliance-level planning. Taken together, these policy adaptations illustrate that the Arctic's emergence as a climate-driven security frontier does not demand entirely new security paradigms. Rather, it requires the systematic integration of environmental change into existing security frameworks, ensuring that strategic planning remains aligned with the evolving physical and geopolitical realities of the High North.

> **"Environmental change amplifies strategic stakes, forcing allies to adapt posture, policy, and governance in tandem."**

7. Conclusion

The Arctic is no longer a peripheral theatre defined by symbolic presence or resource competition. It has become a structural testing ground where climate change reshapes the very logic of deterrence. Retreating sea ice, thawing permafrost, and rising environmental volatility are not just background conditions—they directly condition operational feasibility, infrastructure resilience, and strategic planning. In this context, military power alone does not determine influence. Russia leverages accessibility while managing infrastructure fragility; the U.S. and NATO prioritize mobility, resilience, and alliance coordination; the EU emphasizes adaptive governance; and China asserts a strategic presence without territorial claims. Across all actors, climate-driven transformation alters both opportunity and vulnerability, creating a security environment defined less by confrontation than by the capacity to operate effectively under accelerating ecological change. The Arctic thus illustrates a broader strategic lesson: environmental change can recalibrate the conditions under which states define and pursue security. Success depends not on dominance alone, but on the ability to integrate climate realities into planning, infrastructure, and multilateral cooperation. The region does not foreshadow an imminent great-power war; it signals a subtler, more consequential transformation in how states conceive defence. The question is no longer whether the Arctic will militarize, but whether defence institutions can adapt quickly enough to prevent climate-driven instability from hardening into strategic fragility

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