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SYMPOSIUM ON THE FUTURE OF A MELTING ARCTIC: CHALLENGES FOR INTERNATIONAL LAW

ENVIRONMENTAL CHALLENGES OF INCREASING ARCTIC CRUISE SHIP TOURISM

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Introduction

As the Arctic warms and snow and sea ice melts, hitherto inaccessible parts of the Arctic Ocean are opening up, with important implications for the shipping sector generally and the cruise ship industry specifically. Thus far, international regulation has failed to keep pace with the environmental impacts of increasing cruise ship activity, in particular black carbon (BC) emissions and underwater radiated noise (URN). The absence of binding international regulation on BC and URN reflects a widening regulatory gap at precisely the moment when legal intervention is most needed to mitigate escalating and potentially irreversible environmental impacts.

Cruise vessels have operated in Arctic waters for decades, but their numbers have increased sharply in recent years: seventy-seven unique cruise vessels operated within the Polar Code[1] area in 2013, compared with roughly five hundred in 2023, with further growth anticipated as sea-ice decline continues.[2] The most frequently visited cruise routes are concentrated around Iceland and Norway,[3] while substantial cruise tourism activity also occurs in the coastal waters of Greenland and Canada.

The increase in cruise ship activity is being driven by both climatic and socioeconomic forces. The opening of the Arctic makes routes physically possible, but demand is also fueled by what scholars describe as "last chance tourism," a trend in which visitors are motivated to experience environments they believe are at risk of disappearing.[4] The melting of sea ice facilitates such visitation geographically and

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[1] IMO, *International Code for Ships Operating in Polar Waters*, Res. MEPC.264(68) and MSC.385(94) (adopted May 15, 2015, entered into force Jan. 1, 2017) [hereinafter Polar Code]. The Polar Code is an IMO instrument with the aim of "provid[ing] for safe ship operation and the protection of the polar environment." *Id.*, Introduction, at 1.

[2] Protection of the Arctic Marine Environment (PAME), *Ship Types in the Polar Code Area 2019*, *in* ARCTIC MARINE TOURISM REPORT (2021); Arctic Council, *Arctic Shipping Update: 37% Increase in Ships in the Arctic Over 10 Years* (Jan. 31, 2024).

[3] Yui-yip Lau, Maneerat Kanrak, Adolf K.Y. Ng & Xavier Ling, *Arctic Region: Analysis of Cruise Products, Network Structure, and Popular Routes*, 46 POLAR GEOG. 157 (2023); Hjalti Hreinsson, *Tourism Vessels in the Arctic: ASTD Presentation* (Arctic Marine Tourism Project Workshop, Feb. 3, 2020, Oslo, Norway), PAME, (last visited Jan. 5, 2026); Arctic Council, *As Arctic Marine Tourism Increases, How Can We Ensure It's Sustainable?* (May 10, 2021) (last visited Jan. 12, 2026).

[4] David Palma et al., *Cruising the Marginal Ice Zone: Climate Change and Arctic Tourism*, 42 POLAR GEOG. 215 (2019).

symbolically.[5] Proponents describe Arctic cruises as encounters with a pristine landscape, emphasizing local revenue and community development.[6]

However, the growth in the Arctic cruise industry carries mounting risks, including environmental stress on fragile ecosystems[7] and increasing burdens for small and remote communities already navigating rapid climate-induced change.[8] Among the environmental harms associated with cruise traffic, BC emissions and URN are particularly acute. BC accelerates regional warming by darkening snow and ice surfaces, reducing albedo (a measure of how much sunlight (solar radiation) a surface reflects back into space rather than absorbing), and accelerating melt, while URN disrupts marine mammals that rely on sound for migration and communication.[9] These effects are especially pronounced in pristine, highly sensitive polar ecosystems.

Significantly, both BC and URN are pollutants for which reductions would yield rapid and measurable environmental benefits, making them comparatively "low-hanging fruit" for regulation.[10] Despite this, regulation remains markedly underdeveloped. Currently, the regulatory landscape is fragmented.[11] Progress at the international level has been incremental and largely non-binding,[12] while regional institutions like the Arctic Council lack authority to impose binding environmental obligations. This has resulted in a tendency toward industry self-regulation through operator-led associations,[13] raising questions of legitimacy, accountability, and effectiveness. In this sense, the challenge is not merely the increase in Arctic cruise traffic, but the persistent misalignment between accelerating environmental impacts and the slow regulatory pace.

[5] Jackie Dawson, Emma J. Stewart, Margaret E. Johnston & Christopher J. Lemieux., *Identifying and Evaluating Adaptation Strategies for Cruise Tourism in Arctic Canada*, 24 J. SUSTAIN. TOURISM 1425 (2016); Marta Bystrowska, *The Impact of Sea Ice on Cruise Tourism on Svalbard*, 72 ARCTIC 151 (2019).

[6] Carina Ren, Laura James, Albina Pashkevich & Hindertje Hoarau-Heemstra, *Cruise Trouble: A Practice-Based Approach to Studying Arctic Cruise Tourism*, 40 TOURISM MGMT. PERSP. 100901 (2021); Margaret Johnston, Jackie Dawson & Emma Stewart, *Marine Tourism in Nunavut: Issues and Opportunities for Economic Development in Arctic Canada*, *in* PERSPECTIVES ON RURAL TOURISM GEOGRAPHIES: CASE STUDIES FROM DEVELOPED NATIONS ON THE EXOTIC, THE FRINGE AND THE BORING BITS IN BETWEEN 115 (Rhonda L. Koster & Doris A. Carson eds., 2019).

[7] Hindertje Hoarau-Heemstra, Karin Wigger, Julia Olsen & Laura James, *Cruise Tourism Destinations: Practices, Consequences and the Road to Sustainability*, 30 J. DEST. MARKETING & MGMT. 100820 (2023).

[8] Amanda Hauso Sandven, Matias Thuen Jørgensen & Philipp Wassler, *Residents' Coping with Cruise Tourism*, 105 ANN. TOUR. RES. 103732 (2024); Hannes Hansen-Magnusson & Charlotte Gehrke, *Navigating Towards Justice and Sustainability? Syncretic Encounters and Stakeholder-Sourced Solutions in Arctic Cruise Tourism Governance*, 13 POLAR J. 216 (2023).

[9] Jukka-Pekka Jalkanen, Lasse Johansson, Mathias H. Andersson, Elisa Majamäki & Peter Sigray, *Underwater Noise Emissions from Ships During 2014–2020*, 311 ENVTL. POLLUT. (2022); Thomas L. Brewer, *Black Carbon Emissions in International Maritime Shipping*, *in* REDUCING EMISSIONS OF SHORT-LIVED CLIMATE POLLUTANTS 309 (Yulia Yamineva, Kati Kulovesi & Eugenia Recio eds., 2023); Tom A. Smith & Jake Rigby, *Underwater Radiated Noise from Marine Vessels: A Review of Noise Reduction Methods and Technology*, 266 OCEAN ENG'G 112863 (2022).

[10] Clean Arctic Alliance, *Low Hanging Fruit: Reducing Shipping's Black Carbon Emissions This Decade* (June 28, 2023); Melanie L. Lancaster, Peter Winsor & Andrew Dumbrille, *Underwater Noise from Shipping: A Special Case for the Arctic*, *in* SUSTAINABILITY IN THE MARITIME DOMAIN: TOWARDS OCEAN GOVERNANCE AND BEYOND 271 (Angela Carpenter, Tafsir M. Johansson & Jon A. Skinner eds., 2021).

[11] Giovany Cajaiba-Santana, Olivier Faury & Maarouf Ramadan, *The Emerging Cruise Shipping Industry in the Arctic: Institutional Pressures and Institutional Voids*, 80 ANN. TOUR. RES. (2020).

[12] Ana Stella Ebbersmeyer, *Mitigating Arctic Maritime Black Carbon Emissions Through Fuel-Based Regulation: A Critical Appraisal*, CLIMATE LAW (published online Feb. 11, 2026); Taehwan Joung, Daejung Hwang & Junggyu Shin, *An Introduction of the International Maritime Policy Trend on Underwater Radiated Noise from Shipping*, 6 J. INT'L MAR. SAFETY, ENVTL. AFF. & SHIPPING 216 (2022).

[13] William D. Halliday, Pierre-Louis Têtu, Jackie Dawson, Stephen J. Insley & R. Casey Hilliard, *Tourist Vessel Traffic in Important Whale Areas in the Western Canadian Arctic: Risks and Possible Management Solutions*, 97 MAR. POL'Y 72 (2018).

Drivers of Arctic Cruise Growth

The sharp increase in cruise activity in the Arctic is rooted in physical changes to the region's geography and navigability. Rising temperatures have led to a rapid decline in both the extent and thickness of sea ice, opening passages for longer portions of the year and enabling vessels to enter areas that were previously inaccessible. These changes are not merely expanding possible routes; they are transforming the risk calculus for operators, lowering insurance and navigation costs, and making itineraries more predictable.

Yet navigability alone does not explain the surge in the Arctic cruise industry. The accessibility created by warming has intersected with powerful tourism-market dynamics, especially the rise of "last chance tourism," in which travelers seek to visit sites perceived as fragile or vanishing.[14] Scholars note that the Arctic, like Antarctica before it, has become a "destination," marketed explicitly through the specter of climatic vulnerability.[15] The promise of witnessing a pristine and changing ecosystem, combined with the symbolic appeal of "remote" or "untouched" spaces, has proven commercially potent, driving demand for itineraries deeper into sensitive polar waters.

At the same time, the political economy of Arctic tourism has reinforced this growth trajectory. Arctic cruise tourism is seen by some local communities as a vehicle for revenue generation, economic diversification, and international visibility.[16] For small settlements with limited economic alternatives, port calls can represent an important income stream. But these gains are unequally distributed, and many of the costs—including environmental disturbance, pressure on infrastructure, and cultural disruption—are borne locally by communities least equipped to manage them.[17]

Thus, the expansion of Arctic cruise tourism is shaped by a dual dynamic: climate change creates the material conditions of possibility, while economic and experiential incentives generate sustained market demand. This combination has produced a pace of growth that outstrips the regulatory system's ability to keep up with the associated environmental risks.

Black Carbon Emissions and Underwater Radiated Noise

The environmental impacts of Arctic cruising are manifold, including wastewater discharge, solid waste, fuel spills, and air pollutants other than BC.[18] This essay focuses on BC and URN for two reasons: first, because of the international nature of the regulatory processes dealing with these environmental problems; and second, because reductions in these pollutants would yield immediate and measurable environmental benefits, both locally (by protecting sensitive ecosystems) and globally (through climate feedback mechanisms).[19]

BC consists of fine particulate matter emitted primarily from the combustion of heavy fuel oil and diesel. When deposited on ice and snow, BC darkens the surface, reduces albedo, and accelerates melting, creating a feedback loop that intensifies regional warming. URN, produced by propellers, engines, and auxiliary machinery, interferes

[14] Palma et al., *supra* note 4, at 235.

[15] Dawson, Stewart, Johnston & Lemieux, *supra* note 5; Bystrowska, *supra* note 5.

[16] Ren, James, Pashkevich, Hoarau-Heemstra, *supra* note 6; Johnston, Dawson & Stewart, *supra* note 6.

[17] Hoarau-Heemstra, Wigger, Olsen & James, *supra* note 7; Hauso Sandven, Thuen Jørgensen & Wassler, *supra* note 8; Hansen-Magnusson & Gehrke, *supra* note 8.

[18] İ. Çağrı Kolçak1, Oktay Çetin & Murat Saka, *Environmental Impact of Cruise Shipping in Arctic Region*, 9 INT'L J. ENV'T & GEOINFORMATICS 1 (2022).

[19] Mathijs J. H. M. Harmsen et al., *Co-benefits of Black Carbon Mitigation for Climate and Air Quality*, 163 CLIMATIC CHANGE 1519 (2020); Daniel Bodansky, *Climate Change: Reversing the Past and Advancing the Future*, 115 AJIL UNBOUND 80 (2021); Lancaster, Winsor & Dumbrille, *supra* note 10.

with marine mammals' ability to communicate, navigate, and detect predators or prey—impacts that are amplified in polar waters where species such as narwhals, bowhead whales, and seals rely heavily on acoustic signals.

While all Arctic shipping contributes to these impacts, cruise vessels exert a disproportionate effect for several reasons. First, they often operate in ecologically sensitive and spatially complex areas, including fjords, ice margins, and coastal waters, rather than merely transiting established shipping lanes. Second, unlike cargo or tanker vessels, cruise ships frequently travel slowly or remain stationary for sightseeing and wildlife observation, increasing BC emissions per unit distance and maintaining a near-continuous acoustic footprint. Third, cruise itineraries often involve repeated visits to the same locations within a season, magnifying cumulative stress on fragile ecosystems. For example, repeated URN exposure in fjords and coastal areas can disrupt marine mammal migration and feeding patterns in ways transient shipping traffic does not. The combination of deep-ice access, low-speed operation, and repeated visitation make cruise ships uniquely significant actors in the Arctic.

Regulating BC and URN from Arctic Cruises

In regulating BC emissions and URN from Arctic cruise ships, the International Maritime Organization (IMO) is the central actor. Its regulatory framework governs international shipping activities, including cruise vessels operating in Arctic waters. Key instruments include the International Convention for the Prevention of Pollution from Ships (MARPOL) and the Polar Code.

MARPOL Annex VI, which addresses air pollution from ships, could be used to regulate BC emissions. However, despite growing recognition of BC's disproportionate impact in the Arctic, IMO has yet to adopt binding measures specifically targeting BC emissions reduction. Current IMO BC efforts remain limited to emission measurement and reporting,[20] and voluntary guidance on the use of cleaner fuels under the 2021 IMO Resolution MEPC.342(77), which encourages the reduction of BC emissions.[21] Discussions continue within the Marine Environment Protection Committee (MEPC) and its Sub-Committee on Pollution Prevention and Response (PPR) on possible amendments to MARPOL Annex VI that could introduce mandatory control measures.[22]

In the case of URN, regulatory efforts are even less advanced. While IMO has recognized underwater noise as a significant stressor for marine life, there are no binding international standards in place. In 2014, IMO adopted the Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life, which are voluntary and primarily recommend design, maintenance, and operational practices to minimize noise.[23] Recently, IMO has revised and strengthened these guidelines;[24] however, they remain hortatory in nature and are thus non-binding. An IMO working group explicitly recognized this limitation, concluding that the voluntary character of the guidelines, rather than their technical feasibility, was a key barrier to their broader uptake.[25]

[20] IMO, *Guidelines on Recommendatory Black Carbon Emission Measurement, Monitoring and Reporting*, Resolution MEPC. 394(82) (adopted Oct. 4, 2024).

[21] IMO, *Protecting the Arctic from Shipping Black Carbon Emissions*, Resolution MEPC.342(77) (Nov. 26, 2021).

[22] IMO, *Report of the Marine Environment Protection Committee on Its Eighty-Third Session*, MEPC 83/17, at 18 (Apr. 29, 2025).

[23] IMO, *Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life*, MEPC.1/Circ.833 (Apr. 7, 2014).

[24] IMO, *Revised Guidelines for the Reduction of Underwater Radiated Noise from Shipping to Address Adverse Impacts on Marine Life*, MEPC.1/Circ.906/Rev.1 (Nov. 15, 2024).

[25] IMO, *Sub-Committee on Ship Design and Construction*, (SDC 8), Jan. 17–21, 2022 (last visited Jan. 12, 2026); Clean Arctic Alliance, *SDC9: Progress on Shipping's Underwater Noise Impact Welcomed, But IMO Falls Short of Immediate Action* (Jan. 27, 2023) (last visited Jan. 12, 2026).

While the adoption of the Polar Code was an important step in establishing safety and environmental requirements tailored to polar shipping conditions, it does not address BC or URN, nor does it specifically focus on cruise ships. This gap exposes a structural weakness in the existing regulatory regime: although IMO's framework applies to Arctic cruise ships, its instruments are not yet adapted to the unique environmental impacts of Arctic cruise ship tourism.

Beyond IMO, regional, domestic, and industry-driven initiatives have attempted to fill some of these regulatory gaps. At the regional level, the Arctic Council, through its working and expert groups, has advanced several measures, including the Framework for Action on Black Carbon and Methane[26] and Arctic URN management strategies.[27] However, the Arctic Council is not able to adopt binding rules and its influence remains limited.

In terms of domestic regulation, a harmonized approach to regulating cruise ship tourism is largely absent, meaning that the Arctic countries all have different approaches, which reflect their national priorities and governance structures. Norway, for example, combines its National Tourism Strategy 2030 with bans on heavy fuel oil (HFO) around Svalbard[28] and zero-emission requirements for cruise ships in UNESCO-listed fjords from 2026, explicitly linking cruise tourism to climate mitigation.[29] Iceland addresses cruise ship emissions through its National Climate Action Plan, which targets carbon neutrality by 2040 and indirectly phases out HFO via strict sulfur limits on marine fuels, complemented by cruise passenger taxes aimed at supporting sustainability.[30] Denmark's Arctic cruise governance is primarily exercised by Greenland, which exercises self-government over environmental matters yet lacks a dedicated national climate strategy and instead aims to promote (sustainable) cruise tourism growth for economic development.[31]

In parallel, industry self-regulation, particularly through the Association of Arctic Expedition Cruise Operators (AECO), has emerged as a complementary mechanism. AECO develops and implements voluntary operational standards and environmental guidelines for its members, covering issues such as fuel use, waste management, and wildlife disturbance.[32] While these initiatives demonstrate industry awareness and a willingness to act, they raise legitimacy and accountability concerns, as the standards are defined by industry actors rather than public authorities, and compliance depends on reputational incentives rather than formal oversight. Moreover, their voluntary nature underscores the broader regulatory gap: the absence of mandatory, enforceable standards specifically tailored to the environmental realities of Arctic cruise ship tourism.

Conclusion

The warming Arctic is creating a widening gap between the pace of environmental change and the pace of regulation. Cruise tourism is a case in point. It is growing rapidly, as a result of retreating sea ice (which has

[26] Arctic Council, *Enhanced Black Carbon and Methane Emission Reductions: An Arctic Council Framework for Action*, SAO Report to Ministers, Annex 4 (2015).

[27] Arctic Council, *Underwater Noise in the Arctic: Understanding Impacts and Defining Management Solutions – Phase II* (May 2025).

[28] Lov om miljøvern på Svalbard (svalbardmiljøloven), LOV-2001-06-15-79 (July 1, 2002); Regjeringen Solberg Klima- og Miljødepartementet, *Foreslår Tungoljeforbod for Skip på Svalbard* (2020).

[29] Government Norway, Ministry of Climate and Environment, *Introducing Zero-Emission Requirements in the World Heritage Fjords* (Sept. 30, 2024).

[30] Government of Iceland, Ministry for the Environment and Natural Resources, *Iceland's National Plan* (Nov. 2020); Government of Iceland, *Regulation Banning the Use of Heavy Fuel Oil in the Territorial Sea of Iceland* (Dec. 6, 2019); *Iceland Reinstates Tourism Tax for 2024, Expands to Cruises* (Jan. 14, 2024).

[31] Visit Greenland, *Visit Greenland Strategy 2025–2035* (2025); *Visions: Greenland*, NATNORTH (last visited Dec. 5, 2025).

[32] AECO, *Guidelines* (last visited Jan. 5, 2026).

opened up places previously difficult or impossible to access), growing demand for "last chance tourism," and local hopes for income and development. This growth is impacting fragile ecosystems with limited capacity to absorb the mounting pressure. But the regulatory response has been very limited.

In the Arctic, BC and URN are two particularly acute stressors closely tied to typical cruise operations. BC has an immediate climate impact because deposition on snow and ice accelerates melting by reducing their albedo. URN matters because many Arctic marine mammals depend on sound for basic life functions; persistent noise in confined waters can disrupt behavior in ways that are hard to reverse.

The IMO has acknowledged both issues, but progress has been slow and largely non-binding. The Polar Code and MARPOL provide an overall legal framework, but fall short. Domestic laws in Arctic states have not substantially gone beyond international regulation and remain fragmented across jurisdictions. Regional initiatives and industry standards (including AECO) remain voluntary and are unable to deliver meaningful outcomes. Even if the international community cannot stop Arctic warming, it needs to do more to limit the impacts on the Arctic's fragile and unique ecosystem.