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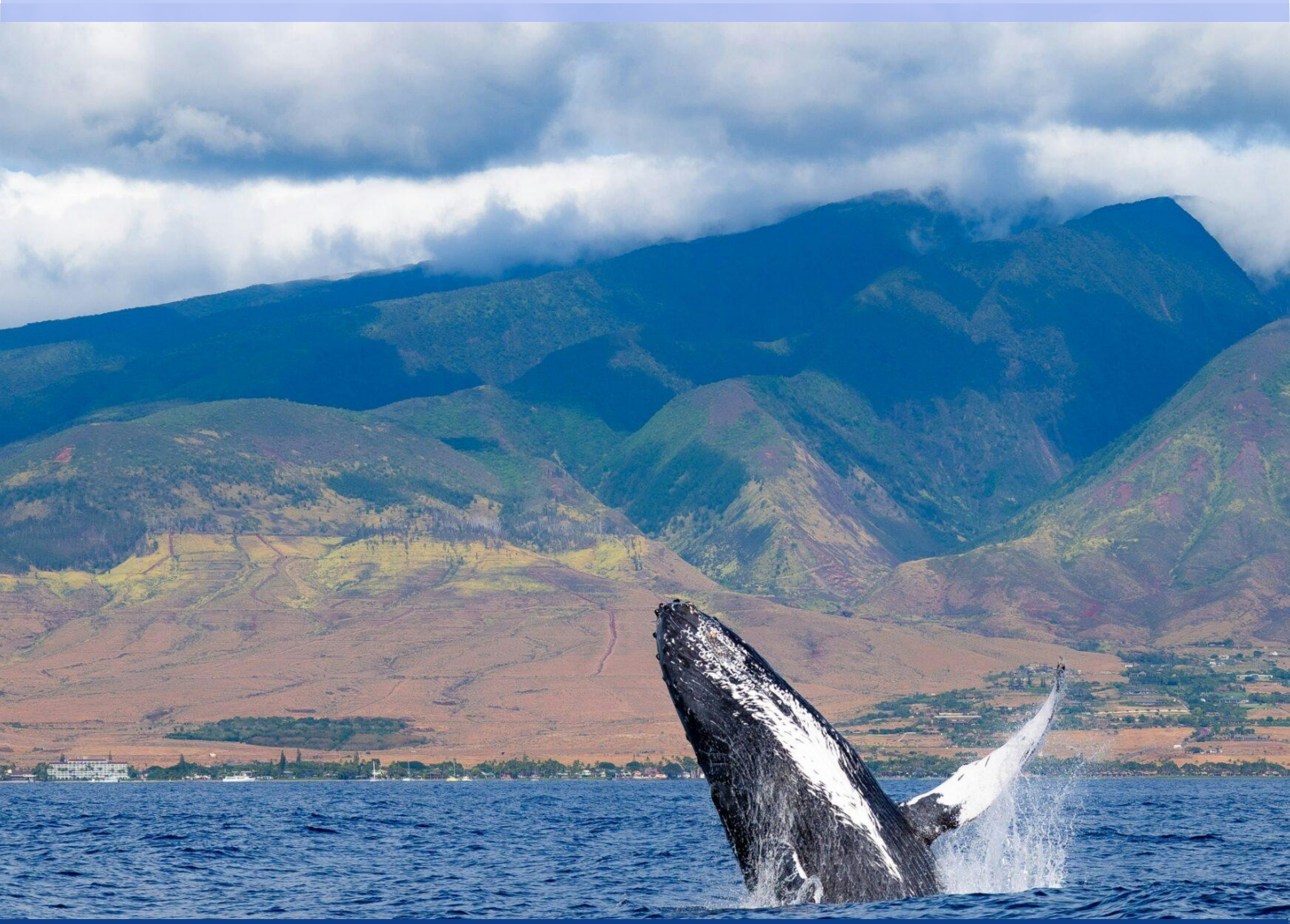

HIGH SEAS TREATY TO ENTER FORCE

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Polar and ocean research plays a key in developing a knowledge database on the unknown horizons in the earth's system. We currently witness vast changes in ocean temperatures, glacier shrinking, and ice sheets in the polar regions, which could have a critical impact on the seas, life in the ocean and land. Understanding the nature of the polar regions and oceans is essential through a multidisciplinary approach.

NIAS Polar and Ocean Studies aims to study the polar regions - the Arctic and Antarctic. On the Oceans, it aims to study the following verticals: Governance, Conservation, Blue Economy, Security, Infrastructure, Ocean Health, Ocean Science, Ocean as a Global Common and Maritime Security

Indo-Arctic Reader will focus on capacity building amongst young scholars, expert lectures by prominent academicians and diplomats, monthly discussions on Europe and a Monthly Dispatch – *Indo Arctic Reader*.

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National Institute of Advanced Studies
NIAS

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The National Institute of Advanced Studies (NIAS) was conceived and founded in 1988 by the late Mr JRD Tata, who sought to create an institution to conduct advanced multidisciplinary research.
The objective is to nurture a broad base of scholars, managers and leaders who would respond to the complex challenges that face contemporary India and global society, with insight, sensitivity, confidence and dedication.

About Indo-Arctic Reader

Indo-Arctic Reader is an academic initiative started by NIAS Global Politics under the Science, Technology and International Relations Programme.

The Monthly is an integral part of NIAS Polar and Ocean research. It includes focused commentaries on the Arctic and the Antarctic and daily updates on contemporary Polar. The opinions expressed in this publication are those of the authors. They do not purport to reflect the opinions or views of any institutions or organisations.

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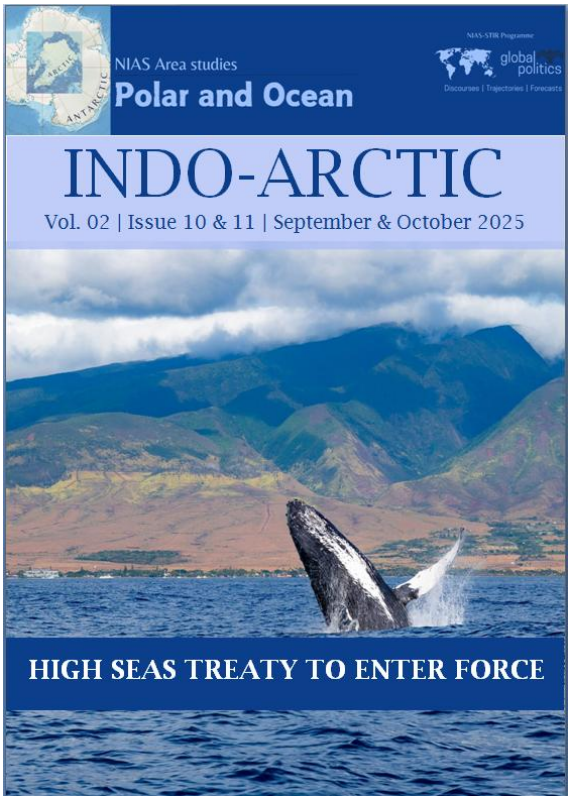

Source: Oceanography

IA COMMENTS

High Seas Treaty ratified: Who are the signatories? Why does it matter?
By Padmashree Anandhan

US and Denmark's discord and the entangled future of Greenlanders
By Padmashree Anandhan

China launches first underwater manned vehicle: What are its objectives? Where do other non-Arctic states stand in deep-sea missions?
By Lekshmi MK

IA DAILY BRIEF

By Lekshmi MK and Padmashree Anandhan

Source: KSAT, Liu Shipping, polarbearsinternational, Niels Fuchs, University of Hamburg, Murmansk Telegram, Down to Earth

IA Daily Brief provides a brief overview of the latest developments in the Arctic and Antarctic from climate change, economy, politics, science and technology, security and governance aspects.

COMMENT

High Seas Treaty ratified: Who are the signatories? Why does it matter?

Padmashree Anandhan, *Research Associate, NIAS*

On 19 September, 61 countries ratified the High Seas Treaty, triggering its enforcement from 17 January 2026. The negotiations for the agreement lasted for two decades, and the adoption will enable the establishment of marine protected areas (MPAs) in international waters. The treaty sets rules to preserve and use marine biodiversity sustainably. It will address the threats from climate change, overfishing and pollution.

What is the treaty all about?

The Biodiversity Beyond National Jurisdiction (BBNJ) agreement creates an all-inclusive framework to govern and manage the marine biodiversity beyond the country's jurisdiction. It identifies marine genetic resources (MGRs) as the common heritage of humankind, insisting on a fair and equitable sharing of benefits. This will be overseen by an Access and Benefit-Sharing Committee. Area-Based Management Tools (ABMTs) include Marine Protected Areas (MPAs) that can be projected and recognized to protect biodiversity. This will also help in improving climate resilience and provide food security, combined with science and Indigenous knowledge. The treaty entails Environmental Impact Assessments (EIAs) for events potentially affecting these areas. This is especially when cumulative and transboundary impacts are taken into account. The EIA also calls for transparency through a Clearing-House Mechanism. The Conference of the Parties (COP) coordinates the governance and will be aided by scientific and technical bodies. Through this, a multi-level supervision can be executed. Whereas capacity building and technology transfer become central to guarantee the participation of developing states in research, conservation and monitoring.

How did it come into?

The first steps for the treaty began two decades before, when the concern for ocean governance and the threats (overfishing, pollution, and climate change) remained fragmented. In 2004, the UN General Assembly formed an Ad Hoc Working Group to fix the gap in the UN Convention on the Law of the Sea 1982, which did not have clear guidelines on protecting BBNJ. By 2011, states had agreed to negotiate on four key issues. First, marine genetic resources (MGRs), area-based management tools (ABMTs), environmental impact assessments (EIAs), and capacity building and technology transfer. Following this, a Preparatory Committee and 4 Intergovernmental Conference sessions were held during 2018 and 2023. These discussions faced several challenges in reaching consensus on the key issues and were delayed due to the pandemic. However, the parties reached an agreement in March 2023, which led to the adoption of the treaty in June 2023. This was seen as a major milestone and the UN Ocean Conference organised by France in June 2025 ensured to win more signatories to the treaty. This helped reach 60 (threshold) ratifications to trigger the enforcement of the treaty in January 2026.

What are the major issues?

First, debate over the common heritage of humankind and freedom of the high seas. During the negotiations, the major debate was whether the high seas and the resources present should be considered as "common heritage of humankind. The negotiations were contrasting with states

raising concerns that a strong language on "common heritage" would limit scientific research and commercial explorations. Overall, the treaty does apply the common heritage principle to marine genetic resources (MGRs), however, the clash over the two principles continues, obscuring implementation.

Second, equal sharing and use of MGRs. Governance of MGRs was earlier not defined, raising concerns over "biopiracy" and unfair exploitation by advanced countries. The concern was mainly across developing countries that lack mechanisms and could risk being excluded from the profits of scientific discoveries from the high seas. The treaty now includes the framework with monetary and non-monetary benefits sharing, but no clear details on how such benefits will be calculated or shared.

Third, absence of global powers. The effectiveness of the treaty can be measured by the involvement of major actors in the treaty. It is under threat due to non-participation from the US, China, and Russia, who have yet to ratify the treaty. This would limit the expansion of MPAs and deteriorate global efforts against overexploitation. The key technological and financial resources could also be retained by these countries.

Fourth, interaction with multilateral institutions. The treaty must coexist and not ignore the existing international institutions, such as the International Seabed Authority (ISA) and Regional Fisheries Management Organizations (RFMOs). Thereby, the success of the treaty will depend on the coordination with these institutions to exercise higher conservation.

Fifth, interaction with other international treaties. The BBNJ agreement must blend with the existing international treaties to prevent legal conflicts and lead to more fragmentation of ocean governance. For example, the Antarctic Treaty System and the governance of the Southern Ocean. Such overlapping jurisdictions can create ambiguity, weaken conservation efforts and impact the decision-making. There is a need for a clear mechanism to resolve disputes, promote cooperation and complement the treaty rather than compete.

What next?

The treaty provides more clarity to the UNCLOS provisions, focusing on science-based requirements for EIAs, ABMTs and benefit sharing. The ambiguous language in the MGRs and the common heritage of humankind principle challenge the execution of the treaty. However, the establishment of a Scientific and Technical body that will ensure transparency and assess the activities that could impact biodiversity is a positive aspect. Looking forward, the implementation should mandate the ocean-climate-biodiversity nexus. This could help integrate climate change adaptation with marine conservation, recognise ocean health and see how biodiversity is linked to all. To execute, there is a need for dynamic management of MPAs, regular monitoring and rapid response to ocean changes. To deliver the BBNJ, linking climate-biodiversity and ocean will be crucial for resilient management.

Padmashree Anandhan is a Project Associate, NIAS Polar and Ocean Studies at NIAS, Bangalore.

COMMENT

US and Denmark's discord and the entangled future of Greenlanders

Padmashree Anandhan, Research Associate, NIAS

What is the row between Denmark and the US over Greenland?

On August 27, tensions sparked between the US and Denmark after a Denmark intelligence report found US-linked personnel engaged in influence operations in Greenland. The operations aimed to promote secession from Denmark and to join the US. Denmark's Foreign Minister Lars Løkke Rasmussen condemned, calling it a violation of international norms and saying that it was "unacceptable" to interfere in Denmark's internal affairs. In response, the US government said that it does not have direct control over the actions of private individuals and that it respects the right of Greenlanders to choose their future. The event shows the increasing tension between the US and Denmark over Greenland since US President Donald Trump's controversial claim to buy Greenland.

Who has visited Greenland till now?

Since 2025, three major foreign officers have visited Greenland. In March, US Vice President JD Vance was the first high-ranking official to visit, where he travelled to Pituffik military base (the northernmost installation of the US). The objective was to showcase Greenland's strategic significance against the growing China and Russia's influence in the Arctic. However, the response within Greenland was critical, with the government refusing to host and public protests forcing the visit to be a military stop. Following this, in April, Denmark's Prime Minister Mette Frederiksen, along with two premiers, visited Greenland to showcase unity within and as a warning to the US. The outcome of the visit was a display of solidarity and joint rejection against the US's ambitions. It was a display of broader EU support against the US's annexation goal; France's President Emmanuel Macron visited Nuuk. The objective was to also to boost ties with Greenland over critical minerals, climate change and security in the Arctic.

What are the US and Denmark's interests in Greenland?

US interests in Greenland have been driven by its strategic importance and natural resources. The US's ambition to annex Greenland did not begin with Trump, but rather dates back 150 years. Greenland, located between North America and Europe, overlapping the Arctic and North Atlantic, has military significance in hosting allied aircraft during World War II and Cold War. Greenland's natural resources, such as rare earth minerals, hydrocarbons and fisheries, continue to interest international powers as resource competition over the Arctic grows. The intensifying climate change, melting ice sheets and opening of new shipping routes have given more scope for Greenland in international shipping and energy sectors. However, the threat rising from China and Russia is most concerning for the US. Its 56,000 residents in an independent Greenland could be vulnerable to Russia's militarisation and China's "near-Arctic" strategies. For the US, Greenland's goals for self-determination were undermined earlier, while the present administration focuses on the strategic importance and respects autonomy.

Denmark's interests are more intertwined with the colonial legacy and geopolitical dynamics. Modern colonialism began in 1721 when religious conversion and trade were established. Greenland was a Danish colony till 1953, but the integration process involved intense "Danization policies" which were more disruptive and continue to influence the relations till today. Greenland's resistance began in 1979 to recognising Greenlanders as citizens under the Self-Government Act 2009. However, Denmark maintains close relations to safeguard its Arctic identity. To ensure this, the government provides an annual block grant of 25% to maintain the economic dependency and trade with the US over Pituffik Air Base in exchange for reduced NATO responsibilities.

What does this mean for Greenland?

First, a growing independence movement. Since the 2009 Act of recognising Greenlanders as people affirmed their right to independence. Denmark and the US continued bids to influence and acquire the region, which will further the movement, as it is still viewed as a geopolitical prize. This can be seen from the recent Greenland constitution 2023 draft, where the core principle is that the future of Greenland is determined by a referendum. The external pressure may prolong this but internally, it strengthens the independence movement towards sovereignty.

Second, a two-fold security problem. Greenland's strategic location makes it an asset in the Arctic, mainly for North Atlantic defence. As long as the US has its military presence, its influence will persist; however, the idea of full control as proposed by Trump might not be possible, as it will risk NATO unity and invade Denmark's sovereignty. While Greenland benefits from NATO's protection, being in the middle of the US-China-Russia tussle will hinder Greenland's Foreign, Defense, and Security Strategy (2024–2033). The strategy calls out that Greenland's defence cannot be decided without Greenland.

Third, Greenlanders in the crossroads of independence, economic competence and environmental damage. Climate change provides both opportunities and makes Greenland vulnerable. The fisheries are the critical sector, while rare earths and critical minerals serve as a ticket for its independence. Greenland can reduce its economic dependency on Denmark through mineral trade. However, the support for large-scale mining is divided, as some see it as a way for sovereignty, while others are concerned about environmental damage and its impact on indigenous livelihoods. This comes after the ban on oil and gas exploration due to environmental concerns and preference for long-term sustainability. Overall, the future of independence for Greenlanders is expected to be entangled with climate change vulnerability and growing geopolitical rivalry.

COMMENT

China launches first underwater manned vehicle: What are its objectives? Where do other non-Arctic states stand in deep-sea missions?

Lekshmi MK, Research Assistant, NIAS

What happened?

On 14 August, during its 15th Arctic Ocean scientific expedition, China successfully conducted the world's first cooperative underwater operation involving a manned submersible named Jiaolong and a Remotely operated vehicle (ROV). The two vehicles carried out synchronised dives, testing communication, positioning systems, and coordinated sample collection, including handing over rock samples and operation markers. Beyond China, several non-Arctic states advanced polar research programmes and demonstrated how they had begun to assert a presence in polar and deep-sea research.

What is the significance of manned submersibles and ROVs?

Manned submersibles and Remotely operated vehicles (ROVs) were the most advanced tools used to explore the deep ocean. Extreme cold, pressure and darkness make exploration risky in the Arctic. Scientists employed these technologies to collect essential information in a safe manner. Jialong provided real-time human monitoring and adaptive decision-making. In the meantime, an ROV offered endurance, accuracy and access to deeper water. They form a hybrid system when used in combination. It improved operational safety, efficiency, sampling, data transmission and environmental monitoring. Such cooperation minimised the risks of technical failure and human error. These technologies were relevant beyond research. They were relevant to resource mapping, undersea cable infrastructure, and maritime security. Therefore, the synchronised Jiaolong-ROV operation was not only a scientific breakthrough but also a technological and strategic forward step that expanded

China's capability for prolonged exploration in the delicate Arctic ecosystem.

What are the objective behind the mission?

China's Arctic deep-sea mission reflected both scientific and strategic calculation. China's expanding deep-sea engineering capability and commitment to becoming a leader in polar research and technology got demonstrated through the Jiaolong-ROV operation. Under its Polar Silk Road Initiative, Beijing framed itself as a "near Arctic state." Thus, it aimed to integrate Arctic routes and resources into the broader Belt and Road Initiatives. China to secure a foothold in Arctic governance, avoided the political friction of military expansion and chose the path of strengthening its presence through research expeditions. China's long-term interests in energy exploration, rare-earth minerals, and shipping routes made accessible by melting ice aligned with this mission. This achievement sent a geopolitical signal where China intent to play a lasting role in shaping the Arctic's future order scientifically, economically, and strategically. It is positioning itself as a legitimate stakeholder in polar affairs.

Where do other non-Arctic states stand in deep-sea missions?

Beyond China, several non-Arctic states advanced their deep-sea and polar research programmes.

First, Japan had developed state-of-the-art technology through its Shinkai 6500 submersible. It explored ocean trenches and contributed to undersea mapping and studies of marine ecosystem. Its Arctic and Pacific cruises concentrated on tectonic activity and climatic research.

Second, India, via its Himadri Svalbard research station and missions such as Samudrayaan, broadened activities from studies of the polar climate to exploring minerals in the deep ocean and biodiversity studies.

Third, South Korea controlled the icebreaker Araon and built capabilities under the Korea Polar Research Institute. It facilitated deep-sea exploration and Arctic logistics. These missions reflected emerging strategic interests and technological ambition under the guise of scientific expedition. Together, the three countries demonstrated how non-Arctic powers had begun to assert a presence in polar and deep-sea research.

How does this contribute to Arctic research?

By expanding the understanding of the Arctic seabed, ecosystems, and climate dynamics, the Jialong-ROV collaboration contributed to polar scientific research. Through precise sampling and real-time observation, the mission gathered data on marine biodiversity, mineral composition, and geological structures. The collected data could help to improve climate models and carbon cycle studies. This integrated operation enhanced knowledge of how deep-sea environments interact with surface climate systems. It also provided information on the effects of thawing ice and warming sea temperatures. The results assisted in comprehension of the probable resource distribution under the Arctic seabed. Nevertheless, this dual use created environmental issues since deeper exploration would open doors to commercial use of vulnerable ecosystems. Therefore, China's scientific contribution is commendable, it also underlines the urgent need for sustainable research practices. It also emphasise for stronger global frameworks to balance discovery with conservation in the Arctic.

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IA DAILY BRIEF

By Padmashree Anandhan and Lekshmi MK

BIODIVERSITY & ECOSYSTEM

Scientists warn of irreversible Antarctic changes impacting key species

On 21 August, scientists at the Australian National University, led by Professor Nerilie Abram, warned that Antarctica was undergoing rapid, interacting changes. He added that these changes may be self-perpetuating, with severe consequences for sea levels and wildlife. A report published in Nature highlighted declines in winter sea ice over the past decade, a slowdown in deep ocean currents, and weakening ice shelves. Emperor penguins, which depend on stable fast ice to breed, were considered at high risk. Since 2016, half of their roughly 60 colonies experienced breeding failure, with many losing fast-ice habitat entirely. The regime shift deemed to have gone beyond natural variability, sea ice loss far exceeded historic levels. Researchers said some changes might be irreversible, even if warming was limited to 1.5 degree Celsius (Jano Gibson, "Iconic Antarctic species at risk amid 'regime shift', scientists say, with 'rapid and self-perpetuating changes'," ABC News, 21 August 2025)

International Red Panda Day 2025 highlights Himalayan "Firefox" conservation

On 20 September, International Red Panda Day 2025 was observed. It raised awareness about the endangered Himalayan red panda, with fewer than 10,000 left in the wild. Launched in 2010 by the Red Panda Network, the campaign engaged zoos, schools, and communities globally. Native to Nepal, India, Bhutan, Myanmar, and China, red pandas are nocturnal and primarily bamboo-eating, with bushy striped tails and coppery coats. They faced threats from deforestation, poaching, the exotic pet trade, and low reproduction rates. The Red Panda Network achieved notable conservation success, including planting over 150,000 trees and bamboo plants, training 100 Forest Guardians, and establishing the 116-hectare Puwamajhuwa Community Red Panda Conservation Area in Nepal. Education and global advocacy were central to the initiative's impact. (Shivam, "International Red Panda Day 2025: Celebrating and Saving the Himalayan "Firefox"," Current Affairs, 20 September 2025)

Undergraduate engineer advances Arctic technology and wildlife research

On 19 September, UM News reported on Aidan Hartry, a second-year undergraduate at the University of Manitoba, spending the summer in the Arctic. He conducted Arctic-focused engineering research through a URA-funded project. He helped design a helium-filled unmanned airship to carry communication equipment to connect remote northern communities. Using computer-aided design, Hartry iterated on the blimp to optimise performance in Arctic conditions. He also developed a novel reaction wheel for satellites using

magnetic liquid instead of solid disks. Additionally, Hartry contributed to the Aerial Tagging System for Beluga Whales project, calculating dart velocities to safely tag whales from drones. Working with Dr Phil Ferguson and the STAR Lab team, he gained hands-on experience in design, testing, and problem-solving for both technological innovation and wildlife applications in extreme environments. ("Undergraduate researcher explores Arctic engineering innovation," UM News, 19 September 2025)

Life thriving amid the harshest conditions in the Arctic

On 10 September, Bioengineer reported a recent study from Stanford University. The study revealed that Arctic diatoms—single-celled algae encased in glass-like walls were not merely surviving but actively gliding through channels in frozen ice at temperatures as low as -15 degree Celsius. Utilising custom-developed microscopes, researchers observed these diatoms moving smoothly within narrow, hair-thin freshwater channels inside ice cores. They employ a unique gliding mechanism involving the secretion of a polymer mucilage and the contraction of actin and myosin fibers, which are molecular motors responsible for muscle contractions in humans. This discovery challenges previous assumptions about cellular motility at subzero temperatures and underscores the adaptability of life in extreme environments. ("Life at the Edge: Exploring Survival Within Arctic Ice," Bioengineer, 10 September 2025)

Ocean's most abundant microbe faces collapse as seas warm

On 09 September, Science Daily reported a decade-long study by the University of Washington. The study revealed that Prochlorococcus,the ocean's most abundant microbe responsible for 5 per cent of Earth's photosynthesis, may collapse under ocean warming. The cyanobacteria, once considered climate survivors, thrived only between 66–86 degree Fahrenheit, with growth rates plummeting above this range. Climate models projected up to a 51 per cent decline in tropical waters and a 37 per cent global loss under high-warming scenarios. Researchers warned that the microbe's streamlined genome prevents adaptation to heat stress, threatening the marine food web that depends on it. Findings, published in Nature Microbiology, suggested potential shifts toward Synechococcus dominance, but with uncertain ecological impacts. (University of Washington, "The ocean's most abundant microbe is near its breaking point," Science Daily, 09 September 2025)

Scientists identify three new snailfish species in deep Pacific Ocean

On 09 September, the research team led by Mackenzie E. Gerringer and colleagues described three new species of snailfish (family Liparidae) from abyssal depths of the eastern Pacific Ocean. They were spanning 3,268 to 4,119 metres deep. Specimens included Careproctus colliculi (bumpy snailfish), Careproctus yanceyi (dark snailfish), and Paraliparis em (sleek snailfish). The bumpy snailfish appeared pink in life with pronounced pectoral fin rays and a rounded head; the dark snailfish was fully black with a horizontal mouth; the sleek snailfish lacked a belly suction disk and bore a long, laterally compressed body. Researchers used morphology, imaging, and genetic data to distinguish the new species. The specimen of C. colliculi was collected in Monterey Canyon using MBARI's ROV Doc Ricketts, while the others were collected during Alvin submersible dives

near Station M. (Rob Hutchins, "Three new species of snailfish discovered in Pacific Ocean depths," Oceanographic, 09 September 2025)

Ocean warming stalls mangrove recovery and erodes economic gains

On 03 September, Phys.org reported that the study by researchers at UC San Diego's Scripps Institution of Oceanography projected that rising ocean temperatures would negate expected gains in mangrove restoration.It may result in a net loss of about 150,000 hectares by 2100. The lost mangroves and their ecosystem services were valued at roughly USD 28 billion annually, with Asia facing nearly two-thirds of the economic impact. Scientists combined high-resolution satellite data, economic indicators, and sea-surface temperature records across 1,533 locations from 1996 to 2020. They also modelled future outcomes under various emissions and development scenarios. While economic growth and conservation stabilised mangrove coverage in the short term. The projections underscored that more aggressive action, both emissions reductions and conservation would be required to secure gains. (Alex Fox, "Ocean warming projected to stall expected mangrove recovery," Phys.org, 03 September 2025)

Antarctic ecosystems at risk without long-term monitoring

On 19 August, a new paper led by University of Wollongong researchers called for the urgent expansion of long-term monitoring programs to better understand and protect Antarctica's often overlooked ecosystems. The study, by scientists from Securing Antarctica's Environmental Future (SAEF), warned that as climate change and environmental pressures reshaped the southernmost continent, sustained research equipped conservationists and governments. They were equipped with critical data needed to devise effective management strategies, anticipate challenges, and craft policies ensuring protection of Antarctica's unique biodiversity. It emphasised that large-scale monitoring would be required to safeguard all Antarctic life, not just species like penguins, but also flora and fauna essential to ecosystem function. Researchers noted that loss of Antarctic biodiversity would have global consequences for ecosystems and communities. ("Antarctic Ecosystems At Risk Without Urgent, Long-term Research," Mirage, 19 August 2025)

Chilean scientists produce first Antarctic bird flu genome maps

On 15 August, a team of Chilean scientists sequenced the first complete genomes of the H5N1 avian influenza virus recovered from birds in Antarctica. This marked a milestone in virological surveillance on the continent. The achievement provided the first genomic insight into the highly pathogenic H5N1 strain in Antarctic seabirds. It also enabled detailed comparisons with global viral variants. Researchers conducted the sequencing using samples obtained during field surveillance operations, though the specific sampling period was not disclosed in the report. The genetic data offered valuable information for tracking the virus's evolution and transmission routes. (Osvaldo Silva, "Scientists sequence avian flu genome found in Antarctica," UPI, 15 August 2025)

Arctic reindeer are projected to decline by up to 80 per cent by 2100

On 15 August, researchers found changes in reindeer (caribou) abundance and distribution across the past 21,000 years using fossils, ancient

DNA, and computer models. Researchers also compared these patterns to future climate projections. They found that reindeer, an Ice Age species, have already lost nearly two-thirds of their global population over the past three decades due to climate change. The models projected that North American caribou populations were at highest risk, with declines of up to 80 per cent by 2100 unless there were major cuts to greenhouse gas emissions and increased wildlife management and conservation investments. The losses were expected to carry major ecological consequences and further exacerbate the vulnerability of both North American caribou and Eurasian reindeer when facing warming and other stressors. (University of Adelaide, "Arctic Reindeer Could Decline by 80% by 2100," UC Davis, 15 August 2025)

Greenland's melting ice is supercharging life in the sea says NASA

On 15 August, SciTechdaily reported that researchers supported by NASA discovered that glacial runoff near Jakobshavn Glacier lifted nutrient-rich deep waters to the ocean surface. They fueled summer phytoplankton blooms that increased by up to 40 per cent. The findings were based on advanced computer simulations published in Nature Communications, Earth & Environment that modeled interactions between marine life and water movement in a turbulent Greenland fjord. During summer melt seasons, vast quantities of meltwater, originating from Greenland's rapidly shedding ice sheet rose hundreds of feet beneath the sea surface. It stirred nutrient-dense waters upward. These nutrients, such as iron and nitrate, were vital for boosting phytoplankton growth, the foundation of marine food webs and a key driver of carbon dioxide absorption. The results highlighted how melting ice was shaping ocean productivity. (NASA's Jet Propulsion Laboratory, "Greenland's Melting Ice Is Supercharging Life in the Sea," SciTechDaily, 15 August 2025)

Deep-Sea expedition reveals thriving life in Pacific Ocean trenches

On 31 July, the BBC reported a Chinese-led expedition documented thriving deep-sea life in the northwest Pacific Ocean at depths exceeding nine kilometres. Using the submersible Fendouzhe, the team from the Chinese Academy of Sciences explored more than 2,500 kilometres of ocean trenches between 5,800 metres and 9,533 metres. They filmed beds of clams, mats of bacteria resembling ice, and dense colonies of tube worms up to 30 centimetres long. They also found previously unknown species such as Macellicephaloides grandicirra. The findings, published in Nature, challenged assumptions about survival under extreme pressure and darkness. It showed ecosystems fuelled by methane and hydrogen sulfide drippping from the seabed. Samples were preserved for future analysis to understand chemosynthetic processes and adaptations to high pressure. Scientists described the abundance of life as "amazing" and unprecedented. (Victoria Gill, "'Communities' of strange, extreme life seen for first time in deep ocean," BBC, 31 July 2025)

Bottom trawling devastates seafloor ecosystems, releasing carbon and disrupting marine life

On 08 August, Earth.org reported that bottom trawling, a prevalent fishing method, was causing irreversible damage to marine ecosystems. The practice involved dragging heavy nets across the seafloor, destroying structures formed over centuries, such

as coral reefs and sponge fields. This destruction led to the transformation of once biodiverse areas into barren wastelands. Additionally, the disturbance of seafloor sediments released significant amounts of carbon dioxide, exacerbating climate change. The article highlighted the urgent need for stricter regulations and alternative fishing methods to protect marine habitats and mitigate environmental impacts. Despite its detrimental effects, bottom trawling continued largely unchecked, posing a silent crisis beneath the ocean's surface. (Mitota P. Omolere, "The Deep Scars of Bottom Trawling: A Silent Crisis on the Ocean Floor," Earth.org, 08 August 2025)

Greenland's melting ice fuels ocean life with nutrient surge

On 07 August, Interesting Engineering reported the NASA-supported study used supercomputers and the ECCO-Darwin Ocean model to reveal that glacial meltwater from Greenland lifted deep-sea nutrients to the surface. This spurred a 15-40 per cent boost in summertime phytoplankton growth in fjord regions. The simulations focused on Jakobshavn Glacier's runoff, which delivered crisp freshwater plumes into heavier saltwater, effectively acting as an elevator for iron and nitrate. Researchers credited this mechanism for helping explain a 57 per cent rise in Arctic phytoplankton observed between 1998 and 2018. Phytoplankton were revealed as critical drivers of marine food webs and carbon capture. The study provided a clearer picture of how melting ice reshaped marine ecosystems, expressing links between glacial processes and ocean productivity. (Mrigakshi Dixit, "Greenland's melting ice is causing a surge in ocean life, NASA study finds," Interesting Engineering, 07 August 2025)

Great Barrier Reef records historic coral loss after ocean heatwave

On 06 August, a new assessment by the Australian Institute of Marine Science (AIMS) revealed that two of the three regions of Australia's Great Barrier Reef experienced the largest single-year drop in coral cover since monitoring began 39 years ago. The survey, conducted between August 2024 and May 2025, found that the northern region's coral cover decreased from 29.8 per cent to 30 per cent, while the southern region saw a decline from 38.9 per cent to 26.9 per cent. The central region also experienced a drop from 33.2 per cent to 28.6 per cent. This significant loss was attributed to last year's unprecedented marine heatwave, marking the fifth mass coral bleaching event since 2016. Despite the declines, considerable coral cover remains across all three regions. (Martina Igini, "Australia's Great Barrier Reef Sees Record Drop in Coral Cover After Ocean Heatwave," Earth.org, 06 August 2025)

Polar bear mothers raise cubs in snow dens through the harsh Arctic winter

On 27 July, Polar bear cubs were born between November and January, deeply protected within snow dens where their mothers remained without eating or drinking for two to four months. Litters of two were most common, though single and occasional triplet litters occurred, with births generally spaced three years apart. At birth, cubs weighed only 1-2 pounds, were blind, and covered in sparse fur. Mothers immediately nursed them up to six times a day with rich milk, approximately 33 pr cent fat, to help them gain weight and develop insulation quickly. Cubs began opening their eyes within a month, started walking around two months, and

emerged from the den in late March or April. Mothers keenly protected their young, though only about one in four cubs survived to independence. (Johanna Kennelly Ullman, "How Polar Bear Mothers Raise Cubs in the Harsh Arctic," A-Z Animals, 27 July 2025)

CLIMATE CHANGE

Arctic soldiers prepare for warm-weather challenges

On 30 September, near Lomben, Sweden, Nordic soldiers train in conditions far removed from the icy Arctic they typically face. Following the summer thaw, the region transforms into swamps filled with insects and thick foliage, resembling a jungle more than a polar battlefield. Soldiers conducted machine-gun drills in these unexpected conditions to prepare for climate-driven shifts that could impact Arctic operations. Experts note that warming temperatures create unpredictable environments, requiring troops to adapt to muddy terrain, dense vegetation, and insect-borne challenges. This approach underscores how climate change is reshaping military readiness in the high north, forcing armies to anticipate scenarios beyond traditional ice and snow, and ensuring that Arctic forces remain operational under diverse conditions. (Sune Engel Rasmussen, "How Arctic Soldiers Train for What They Fear Most: Warm Weather," The Wall Street Journal, 30 September 2025)

China tests Arctic express route to Europe amid rapid climate change

On 18 September, Politico reported China conducting a test voyage along Russia's Northern Sea Route. It was sending the Istanbul Bridge container ship from Ningbo-Zhoushan to Felixstowe, UK, over 18 days, aided by icebreakers. Unlike previous one-off trips, this voyage was designed to establish a regular Asia–Europe shipping route. The Arctic, warming three to four times faster than the global average, opened new trade opportunities and reshaped geopolitical dynamics, with Russia and China at the center. Experts caution the route remained risky due to fragile ecosystems, black carbon emissions, and the ship's lack of ice-strengthening. While not yet a major alternative to traditional routes, the Arctic could supplement trade in coming decades, providing faster transit and strategic experience. (Martina Sapio,"China tests an express route to Europe through a thawing Arctic," Politico, 18 September 2025)

Warming of two-degree Celsius boosts Arctic carbon sink but weakens alpine counterbalance

On 17 September, Phys.org reported the study led by the Chinese Academy of Sciences. The study found that about two degrees Celsius of warming strengthened the greenhouse-gas sink in Arctic permafrost regions. It was due to increased Carbon-di-oxide uptake by denser vegetation and wetter soils. However, the benefit was substantially offset by weakened sinks in alpine permafrost ecosystems, where warming further dried already arid soils, reducing plant growth and increasing emissions from soil decomposition. Data from 1,090 field sites across the Northern Hemisphere under experimental warming were analysed to assess responses of carbon-di-oxide, methane and nitrogen-oxide. Both regions showed elevated nitrous oxide emissions, which despite lower volumes, posed outsized warming risks due to its high global warming potential. Researchers warned that alpine permafrost sinks were vulnerable and urged emissions control to avoid large carbon-cycle feedback. (Chinese Academy of Sciences, "Warming of 2°C intensifies Arctic carbon sink but weakens Alpine sink, study finds," Phys.org, 17 September 2025)

Arctic sea ice loss slowed in 2025 despite record-low winter maximum

On 10 September, Mongabay reported Arctic sea ice reached its summer minimum at 4.6 million square kilometres, marking the 11th-lowest extent since records began in 1979. Despite a record-low winter maximum earlier in March, the summer minimum did not set a new record low as melting stagnated in August. Scientists attributed the slowdown in sea ice loss over the past two decades to natural variability

in oceanic and atmospheric systems. However, they warned that this temporary reprieve could end soon, with rapid melt possible before 2050. The US National Snow and Ice Data Center also began using Japanese satellite data after losing access to key US military data that maintained a continuous Arctic record since 1979. (Gloria Dickie, "No new record low for Arctic sea ice loss in 2025," Mongbay, 16 September 2025)

India urged to act against destructive Himalayan projects

On 17 September, Down to Earth reported that disasters across Uttarakhand, Himachal Pradesh, and Jammu & Kashmir in 2025 highlighting the vulnerability of the Himalayan region. Continuous flooding, landslides, and glacial lake outbursts were worsened by unplanned development projects, such as hydropower, roads, and railway tunnels, and by climate change. Experts noted that projects like the Char Dham road expansion bypassed proper environmental assessments, leading to increased landslides and river destabilisation. Supreme Court warnings emphasised the risk to entire states like Himachal Pradesh. Environmentalists stressed the need for disaster impact assessments, stricter enforcement of regulations, and environmentally sensitive planning. Without prioritising conservation in political agendas, these destructive projects continued, threatening both local communities and the fragile Himalayan ecosystem. (Shiwani Pandey, "India needs to raise its voice against destructive projects in the Himalayas," Down to Earth, 17 September 2025)

Western Himalayas face intensified climate and human-driven disasters

On 17 September, The New Indian Express reported that the western Himalayas experiencing unprecedented climate and human-induced disasters, according to experts. Researchers found that unscientific road and building works, tree felling, and burning of plant litter exacerbated landslides and cloudbursts. Studies revealed that monsoon rainfall decreased over the past 500 years, while extreme events increased, and snow cover declined sharply between 1991 and 2021. Forest fires, mainly anthropogenic, produced black carbon particles that intensified cloudbursts and accelerated glacial melting. Human interventions, such as road widening and construction projects, further destabilised the fragile terrain. Scientists warned that ignoring geological advice amplified losses. Remedies suggested included relocating settlements in unsafe areas, planting soil-retentive species, declaring forest fires punishable, and planning development strictly using scientific guidance. (Yaspal Sundriyal, "Lean on science to save the Himalayas," The New Indian Express, 17 September 2025)

Alaska's landslides pose hazards from rain-drenched mountains to thawing permafrost

On 17 September, Juneau Empire reported that Alaska was experiencing a rise in landslide incidents, attributed to a combination of heavy rainfall and the thawing of permafrost. In 2024, a devastating landslide in Wrangell claimed six lives, with saturated soils from intense rainfall being the primary trigger. Additionally, Southeast Alaska's mountainous terrain, rich in permafrost, was increasingly prone to retrogressive thaw slumps.It can significantly impact water quality in remote regions like the Noatak Valley. These events highlighted the urgent need for comprehensive monitoring and mitigation strategies to address the evolving landscape hazards in Alaska. (Yereth Rosen, "From rain-drenched mountains to Arctic permafrost, Alaska landslides pose hazards," Juneau Empire, 17 September 2025)

Arctic warming disrupts ocean ecosystems, threatening carbon and nutrient cycles

On 16 September, a recent study by Plymouth Marine Laboratory revealed that Arctic warming was altering the flow of carbon and nutrients between the seafloor and open ocean waters. This process was vital for marine life and the ocean's ability to cycle carbon. The research indicated that the Polar Front and the southern boundary

of seasonal ice have shifted northwards by approximately 93 miles since 1960. This shift has led to the "Atlantification" of the Barents Sea, characterised by rapid and extreme reductions in seasonal sea ice cover. Consequently, the amount, timing, and quality of organic matter reaching the seafloor were changing, potentially impacting benthic ecosystems and exposing previously ice-covered areas to human activities like trawling. (Rob Hutchins, "As Arctic continues to warm, ocean ecosystems face major reshape," Oceanographic, 16 September 2025)

Coldest regions are warming faster in Antarctica

On 15 September, Earth.co reported the recent studies revealing that East Antarctica's interior was warming at a rate of 0.45 to 0.72 degree Celsius per decade, surpassing the global average. This accelerated warming attributed to changes in the Southern Indian Ocean, where rising sea surface temperatures have intensified the Subtropical Frontal Zone. This strengthened zone alters atmospheric circulation patterns, directing warm air deep into Antarctica's interior. Additionally, shifts in climate oscillations and the eastward movement of the Mascarene High pressure system have further amplified this warming trend. While coastal regions have remained relatively insulated due to steep ice slopes and thick sea ice, these natural barriers were weakening, making the entire continent more susceptible to climate change. The implications are significant, as the East Antarctic Ice Sheet held a substantial portion of Earth's freshwater, and even minor warming increases the risk of accelerated ice loss and rising sea levels (Sanjana Gajbhiye, "Antarctica's coldest regions are warming faster than predicted," Earth.com, 15 September 2025)

Antarctica's frozen heart warms fast

On 09 September, new research revealed that East Antarctica's vast interior warmed faster than its coastal regions, driven by warm air flow from the Southern Indian Ocean. Scientists at Nagoya University analysed 30 years of monthly temperature records (1993-2022) from unmanned East Antarctic interior weather stations Dome Fuji, Relay, and Mizuho. They found rates of increase of about 0.45-0.72 degree Celsius per decade, exceeding global averages. They traced the mechanism to intensifying ocean fronts and atmospheric circulation changes that funnel heat and moisture inland. Coastal stations had not yet shown statistically significant warming. The findings suggested that current climate models underestimated vulnerability in Antarctica's interior. It implied that future ice loss may be greater than previously projected. ("Antarctica's frozen heart is warming fast, and models missed it," Science News, 09 September 2025)

East Antarctic interior is warming faster than coastal regions

On 08 September, a 30-year study led by Nagoya University found that East Antarctica's interior was warming at a rate of 0.45–0.72 degree Celsius per decade, outpacing both its coastal areas and the global average. The research found that the accelerated warming was due to the increased warm air flow from the Southern Indian Ocean, driven by intensified oceanic fronts and altered atmospheric circulation patterns. This mechanism, previously unrecognised, suggests that current climate models may underestimate the rate of future Antarctic ice loss. The study utilised data from unmanned weather stations in East Antarctica, revealing significant temperature increases in the interior regions. These findings highlighted the need for updated climate models to accurately project future changes in Antarctic ice dynamics. (Nagoya University, "Why the East Antarctic interior is warming faster and earlier than its coastal areas," Phys.org, 08 September 2025)

Orange rivers show shift in Arctic wilderness

On 08 September, UCR News reported that the rivers in Alaska's Brooks Range, once clear, were turning orange and carrying toxic metals. This effect was due to thawing permafrost. As the frozen soil melts, water and oxygen interact with sulfide-rich rocks, creating sulfuric acid that releases metals like iron, cadmium, and aluminum into

rivers. Unlike typical acid mine drainage, this process occured naturally, driven by climate change. Research led by Tim Lyons and colleagues from the University of California, Riverside, showed that these chemical reactions were harming fish and aquatic ecosystems, including key species like chum salmon. The iron-clouded waters also reduce sunlight, affecting insect larvae that fish feed on. Similar contamination was spreading across other Arctic watersheds, posing broad ecological threats. (Jules Bernstein, "Orange rivers signal toxic shift in Arctic wilderness," UCR News, 08 September 2025)

Global temperatures remain above average despite La Niña's return, UN says

On 02 September, the Guardian reported that the UN's World Meteorological Organization announced that global temperatures stayed unusually elevated despite the return of La Nina. La Nina was a natural cooling phenomenon expected between September and November 2025. Although weak La Niña conditions briefly appeared and held at neutral since March, the probability of La Niña forming increased to around 55 per cent for September through November and to 60 per cent for October to December. Crucially, this cooling did not counter the trend of record-setting warmth. The past decade remained the hottest ever recorded, with 2024 confirmed as the warmest year on record. The WMO emphasised that natural climate fluctuations played out against a backdrop of human-induced warming, which continued to drive extreme weather patterns and elevated temperatures globally. (Agence France-Presse, "Global temperatures to remain above average despite return of La Niña, says UN," The Guardian, 02 September 2025)

Antarctic climate shifts could cause catastrophic consequences for generations

On 20 August, CBS News reported the experts warning that Antarctica was undergoing abrupt irreversible changes. It could raise global sea levels by metres and have "catastrophic consequences for generations," researchers said. A state-of-knowledge review published in Nature found that rapid shifts were accelerating across Antarctica's ice sheets, ocean currents, ecosystems, and sea ice with many changes amplifying one another. Since about 2014, Antarctic Sea ice retreated on average 120 kilometres from the coastline roughly three times faster than comparable Arctic ice decline. The West Antarctic Ice Sheet was identified as severely at risk of collapse, which could alone contribute over three metres of sea level rise. Scientists maintained that limiting warming to near 1.5 degree Celsius would be essential to reducing future impacts. ("Abrupt Antarctic climate shifts could lead to "catastrophic consequences for generations," experts warn," CBS News, 20 August 2025)

Arctic heat wave melts one per cent of Svalbard's ice

On 18 August, New Scientist reported that during a six-week heatwave in summer 2024, Svalbard experienced record-breaking temperatures that caused approximately 61.7 gigatonnes of glacier ice to melt. It was equivalent to one per cent of the region's total ice mass. That meltwater contributed 0.16 millimetres to global sea-level rise, rising to 0.27 millimetres when adjacent areas were included. Sea surface temperatures in the Barents and Norwegian Seas were 3.5 to 5 degree Celsius above the 1991–2020 average. Researchers warned that such extreme melting could become common within decades, with 2024 providing a preview of typical Arctic summer conditions in 2100. The findings underscored the potential for accelerated glacier loss across the Arctic under warming climate scenarios. (Michael Le Page, "Unprecedented Arctic heatwave melted 1 per cent of Svalbard's ice," New Scientist, 18 August 2025)

Arctic glaciers face terminal decline as microbes accelerate melting

On 18 August, scientists in Svalbard reported that Arctic glaciers entered a "terminal" decline as warming-driven microbial activity accelerated ice melt. Researchers highlighted how cold-adapted microbes present in snow and ice ecosystems produced dark pigments. The

also highlighted the trapped debris-causing "biological darkening" that increased heat absorption and melting on glacier surfaces. While some microbial communities appeared to reduce methane emissions. Most of them contributed to positive feedback loops by expanding "biologically darkened" zones visible from space, significantly enhancing runoff. The changes occurred in a region warming seven times faster than the global average. Glacier ecologist Dr Arwyn Edwards stressed the urgency of better understanding these fragile ecosystems before they were lost. He also noted that melting threatened microbial diversity, freshwater supplies, and broader climate stability. (Michael Le Page, "Unprecedented Arctic heatwave melted 1 per cent of Svalbard's ice," The Guardian, 18 August 2025)

Nordic regions record unprecedented Arctic-proximate heatwaves

On 18 August, CNN reported that during summer 2025, Norway, Sweden, Finland, and Arctic regions such as Lapland experienced a record-breaking heatwave. It was made at least ten times more likely and 2 degree Celsius hotter by human-induced climate change. Finland experienced a record-setting 22 consecutive days above 30 degree Celsius, while Sweden recorded ten consecutive tropical nights. The extreme heat caused hospitals to overheat and postpone surgeries. It triggered deadly wildfires and toxic algal blooms and resulted in increased drownings as people sought relief in lakes. Reindeer fled to shaded urban areas. The event highlighted the amplified impact of global warming in northern regions. It showed infrastructure and ecosystems were unprepared for such unprecedented high temperatures. (Andrew Freedman, "There's no such thing as a 'coolcation' — you'll be sweating buckets on your Arctic getaway," CNN, 18 August 2025)

Earth records unprecedented ocean heat and sea-level highs

On 15 August, CBS News reported that a State of the Climate report from the American Meteorological Society found that last year saw record-high global ocean heat and sea level. Also, it faced peaks in global temperature and greenhouse gas concentrations. The year's climate data revealed that the oceans absorbed extraordinary amounts of heat, triggering extensive marine warming and contributing to sea-level rise. Greenhouse gas concentrations surged to new highs. The findings underscored the accelerating pace of climate change across multiple key indicators. It signaled a clear escalation in planetary heat uptake and water expansion that risked amplifying extreme weather events, coastal flooding, and marine ecosystem disruptions. ("Ocean heat and global sea level hit new records last year, report finds," CBS News, 15 August 2025)

Sea levels rise longer and faster than realised says Earth.org

On 14 August, earth.com reported that the researchers extended the historical record of Indian Ocean sea levels by 60 years back into the early 1900s using coral core analyses. It said that sea-level rise had begun accelerating around 1959, decades earlier than tide gauges or satellite data had indicated. From the mid-20th century onward, the Indian Ocean's sea level rose approximately 30 centimetres. It affected nearly 30 per cent of the world's ocean. Scientists identified a trace of human-driven climate change, aligning the sea-level rise with rising temperatures and rapid glacial melt. The findings signified that oceans had been responding more strongly to human warming than previously understood. (Rodielon Putol, "Sea levels have been rising longer and faster than we realized," Earth.com, 14 August 2025)

Bryozoans face threats due to ocean warming and acidification

On 16 August, earth.com reported the study on bryozoans published in Communications Biology by ICM-CSIC researchers. Researchers examined how climate change pushed bryozoans like Myriapora truncate beyond their limits. They studied the species' response to warming and acidification using natural volcanic vents off Italy's Ischia, which simulated future ocean conditions. The team discovered that although the animals altered their skeletal structure and maintained relatively stable

microbiomes, acidified conditions degraded microbial diversity. Those microbiomes lost key functions related to nutrition, defence, and stress resistance. Ocean warming also worsened the effects. Bryozoan coverage dropped and mortality increased. The findings revealed that morphological flexibility alone was insufficient to offset the combined stress of acidification and warming. (Rodielon Putol, "'Ocean architects' expose hidden threats of climate change," earth.com, 16 August 2025)

New SASCWATCH program boosts hurricane forecasts with ocean data

On 07 August, Woods Hole Oceanographic Institution launched the SASCWATCH program. This was to study on air-sea coupling with waves, turbulence, and clouds at high winds. This program was funded by the US Office of Naval Research, to enhance hurricane prediction. Over the next three years, researchers deployed a network of ocean sensors, coordinated with satellite systems and high-resolution models. This was to capture real-time air-sea interactions during storms. The project utilised both Argo floats, which monitored temperature and salinity down to 2,000 metres every 10 days and ALAMO floats capable of rapid deployment from aircraft to collect near-instant data. The initiative aimed to fill knowledge gaps in how surface waves, currents, and atmospheric turbulence affect momentum, heat, and moisture transfers during high-wind events, enabling more accurate hurricane forecasts. ("New Program Aims to Improve Hurricane Predictions with Ocean Data," Ocean News & Technology, 07 August 2025)

Australia braces for wet spring as negative Indian Ocean Dipole strengthens

On 06 August, the Bureau of Meteorology confirmed the development of a negative Indian Ocean Dipole (IOD). IOD was a climate phenomenon that brings increased rainfall to Australia. This marks the first negative IOD event in three years. The IOD index had fallen to -0.6 degree Celsius, surpassing the threshold of -0.4 degree Celsius for the second consecutive week, indicating a well-established negative phase. The Bureau's modelling projected that these conditions would persist into early spring and remain until December, leading to a wetter than average spring across much of the country. Historical data suggests that previous negative IOD events have contributed to some of Australia's wettest winters and springs on record. (Tom Saunders, "Wet weather forecast for spring as Indian Ocean climate driver emerges," ABC News, 06 August 2025)

DEFENCE & SECURITY

Denmark leads Arctic drills amid tensions over Greenland's status

On 16 September, Denmark conducted a significant military exercise in Greenland, involving over 550 personnel from Denmark, France, Germany, Sweden, and Norway. The operation, named Arctic Light 2025, aimed to bolster joint response capabilities against destabilising threats to Greenland, the Kingdom of Denmark, and NATO in the North Atlantic and Arctic regions. This move came in the wake of US President Donald Trump's recent comments about acquiring Greenland, a semi-autonomous territory under Copenhagen's sovereignty. The exercise underscored Denmark's commitment to defending its Arctic territory and asserting its strategic interests in the region. (Gavin Blackburn, "Denmark leads drills in Greenland at time of tensions over Trump takeover threats," Euro News, 16 September 2025)

Arctic affairs as national security: Consequences for US research priorities

On 17 September, High North News reported that the Trump administration was in the process of securitising Arctic affairs. The process was likely to impact the future of US federally funded research related to the Arctic. This shift in focus may lead to changes in priority areas and overarching principles for Arctic research, with an emphasis on community security, economic security, energy security, and military security. The US Arctic Research Commission's recent report highlighted Alaska's strategic location and natural resources as key factors in advancing

national interests. Consequently, the National Science Foundation's upcoming National Plan for Arctic Research may reflect these new priorities, potentially altering the landscape of Arctic research funding and focus. (Michael , "Trump Administration's Securitization of Arctic Affairs and Its Implications for U.S. Federally Funded Research," High North News, 17 September 2025)

Denmark is planning to acquire P-8 aircraft for Arctic surveillance

On 16 September, Defense News reported that Denmark was planning to acquire a fleet of US made Boeing P-8 Poseidon maritime patrol aircraft. This was to enhance its Arctic surveillance capabilities, particularly around Greenland and the Faroe Islands. Defence Minister Troels Lund Poulsen expressed a preference for collaborating with NATO allies to maximise value and flexibility. However, he indicated willingness to proceed independently if necessary. The P-8, used by several NATO countries, was equipped with advanced sensors and weapons for anti-submarine warfare and can deploy sonobuoys for underwater monitoring. Experts suggested that adopting the P-8 would strengthen ties with allied nations and standardise maritime patrol platforms within the region. (Elisabeth Gosselin-Malo, "Denmark eyes Boeing P-8 aircraft for Arctic surveillance," Defense News, 16 September 2025)

US coast guard monitors Chinese research vessels in US Arctic waters

On 18 August, Gcaptain reported that the US Coast Guard deployed a C-130J Hercules aircraft from Air Station Kodiak as part of Operation Frontier Sentinel to monitor five Chinese research vessels operating over the US's Extended Continental Shelf (ECS) in the Arctic on 13 August. The vessels identified included Xue Long 2, Shen Hai Yi Hao, Ji Di, Tan Suo San Hao (all China-flagged), and Zhong Shan Da Xue Ji Di (Liberia-flagged, owned by Sun Yat-Sen University) This mission reflected a broader trend of increased Chinese research activity in US Arctic waters and underscores growing strategic interest in the region. The Coast Guard, supported by US Northern Command and Alaska Command, continued to use both aviation and new surface assets like the recently commissioned icebreaker Storis and fast response cutter Earl Cunningham, to maintain surveillance and safeguard US maritime sovereignty. (Malte Humpert, "US Coast Guard Sends C-130J on Extensive Arctic Patrol to Monitor Five Chinese Research Vessels Off Alaska," Gcaptain, 18 August 2025) .

NATO increases Arctic naval presence near Russia's coast

On 04 August 2025, Euractiv reported that NATO intensified its military activity near Russia's Arctic coastline by conducting naval exercises involving ships from the Netherlands, Norway, Portugal, and Germany. The maneuvers took place in Arctic waters off northern Norway and the High North. It aimed to enhance alliance interoperability, monitor undersea activity, and secure critical infrastructure such as undersea cables connecting mainland Europe to Svalbard. A spokesperson for NATO's Allied Maritime Command, Commander Arlo Abrahamson, stated that the operations were designed to deepen understanding of the maritime environment, strengthen information-sharing, and practice navigational coordination. The deployment formed part of NATO's broader, periodic effort to maintain vigilance and readiness in the Arctic region. (Aurélie Pugnet, "NATO steps up presence near Russia's Arctic coast," Euractiv, 04 August 2025)

DEEP-SEA

India's Deep Ocean Mission: Aquanaut reached a record of 5,000 metres

On 15 August, The Times of India reported that India accomplished a landmark deep-sea exploration when aquanauts descended to 5,002 metres aboard the French-built Nautile submersible as part of the deep ocean mission and preparations for "Samudrayaan." The preceding day, a second dive reached 4,025 metres. The dives, carried out by Jatinder Pal Singh

and Commander Raju Ramesh. This marked India's deepest-ever underwater human expeditions under the Indo-French collaborative project. Union Earth Sciences Minister Jitendra Singh celebrated the timing as a symbolic "double conquest," coinciding with an Indian astronaut's mission to the International Space Station. The mission aimed to advance human-rated submersibles and underwater resource exploration. It also works with plans to conduct future descents using India's indigenous Matsya 6000 submersible by approximately December 2027. ("Deep Ocean Mission: Samudrayaan in sight, India takes a 5,002m plunge," The Times of India, 15 August 2025)

Global coalition urges deep-sea mining moratorium to protect uncharted ecosystems

On 06 August, Earth.org reported that a coalition of 37 countries, Indigenous communities, scientists, and environmental organisations called for a global moratorium on deep-sea mining. The International Seabed Authority (ISA) approved 31 exploration contracts, with mining activities set to commence as early as 2026. Experts highlighted the severe environmental risks, including habitat degradation, sediment plumes, food web disruption, and the release of toxins and carbon reserves. The Deep Sea Conservation Coalition emphasised the need for comprehensive environmental assessments before proceeding with any mining activities. The call for a moratorium aimed to prevent irreversible ecological damage and ensure that deep-sea ecosystems are protected for future generations. (Rose Morrison, "Protecting Uncharted Ecosystems: Why We Need a Deep-Seabed Mining Moratorium," Earth.org, 06 August 2025)

Chinese expedition uncovers thriving deep-sea life at record depths

On 31 July, the BBC News reported that a Chinese-led research expedition discovered thriving communities of marine life in the northwest Pacific Ocean at depths of up to 9,533 metres. Using the submersible Fendouzhe, scientists from the Chinese Academy of Sciences' Institute of Deep Sea Science and Engineering filmed and photographed clams, tube worms, molluscs, and spiky shrimp-like creatures living in extreme darkness and pressure. The team covered more than 2,500 kilometres of ocean trenches and documented species never seen before. The findings, published in Nature, challenged long-standing assumptions about deep-sea life, revealing that entire ecosystems fueled by methane and hydrogen sulfide may be widespread. Researchers described the abundance of animals at such depths as "amazing." (Victoria Gill, "'Communities' of strange, extreme life seen for first time in deep ocean," BBC News, 31 July 2025)

DIPLOMACY

EU-North America collaboration for Arctic monitoring: Strengthening transatlantic cooperation in Arctic research

On 29 September, North American partners joined an EU-funded program aimed at strengthening Arctic monitoring, training, and knowledge sharing under the INTERACT project. The Arctic is warming nearly three times faster than the global average, triggering unpredictable climate and environmental changes with worldwide repercussions. To tackle this, North American partners and EU joined together under the INTERACT project, which established a network of around 80 Arctic research stations across the EU, the US and Canada. To better understand and address these challenges, the European Union funded the INTERACT project. This is a large-scale international initiative linking

around 80 Arctic research stations across the EU, the US and Canada. The project facilitated transnational access for over a thousand scientists to conduct research on permafrost, greenhouse gases, snow cover, biodiversity, and Indigenous livelihoods. It particularly strengthened collaboration with North American partners like the University of Alaska's Toolik Field Station, which hosted several young European researchers. INTERACT not only enhanced climate monitoring but also nurtured future research networks, paving the way for new programs such as POLARIN and Arctic PASSION, which focus on sustainable, standardised monitoring and continued cooperation. ("Arctic research cooperation delivers global benefits," European Commission, 29 September 2025)

Australia-Japan workshop strengthens Antarctic science collaboration

On 22 September, Australian Government reported that From July 2025, Australian and Japanese Antarctic and Southern Ocean scientists met in Tokyo to plan future collaborative research. The workshop, attended by 26 Australia's citizens and 55 Japan's scientists, focused on logistical coordination, long-term monitoring of penguins and krill, and multidisciplinary ecological surveys of East Antarctica. Hosted by the National Institute of Polar Research (Japan) and the Australian Antarctic Division, with support from the Australia-Japan Foundation, the event reinforced strategic scientific collaboration. The workshop produced a Communiqué outlining priority areas for research over the next five years and beyond, emphasising shared commitment to Antarctic conservation under climate change. ("Collaboration and coordination on the agenda at Aus-Japan workshop on Antarctic science," Australian Government, 22 September 2025)

US, Canada, and Finland launch icebreaker pact to counter Arctic rivals

On 16 September, Bloomberg reported that United States, Canada and Finland indulge in a race for Arctic supremacy with the icebreakers pact to counter Russia and China's growing influence. The US, Canada, and Finland established the Icebreaker Collaboration Effort (ICE Pact) to strengthen Arctic and polar capabilities. The trilateral initiative focused on shipbuilding, workforce development, research, and international partnerships to counter Russia and China's growing influence in the region. A formal Memorandum of Understanding signed in November 2024 outlines collaboration on designing, producing, and maintaining icebreakers, supporting maritime infrastructure, and advancing scientific research. While the pact aimed to build a resilient shipbuilding industry, it also signalled the strategic importance of Arctic security amid climate-driven accessibility and intensifying geopolitical competition. (Danielle Bochove and Laura Millan, "Countries Race for Arctic Supremacy With New Icebreakers: Green Daily," Bloomberg, 16 September 2025)

European Commission doubles financial support to Greenland to strengthen Arctic influence

On 08 September, the European Commission proposed doubling its financial support to Greenland. The hike was as part of the upcoming EU budget, signaling a strategic move to bolster Europe's presence in the Arctic amid rising geopolitical tensions involving Russia, China, and the United States. This funding aimed to enhance Greenland's infrastructure, scientific research, and resilience against external pressures, reinforcing the EU's commitment to regional stability. The initiative also countered the growing assertiveness of other global powers in the Arctic. In parallel, Denmark conducted military drills in Greenland, highlighting the territory's strategic importance in the current international climate. (Gregoire

Lory, "European Commission doubles financial support to Greenland to gain influence in the Arctic," Euro News, 08 September 2025)

Countries begin negotiations for a Global Plastics Treaty

On 07 August, Sea Shepherd Global highlighted that plastic fishing gear including nets, lines, and buoys accounted for up to 86 per cent of pollution in the Pacific Garbage Patch, posing deadly threats to marine wildlife and habitats. The organisation urged world leaders in Geneva to adopt a robust Global Plastics Treaty by 14 August. The urgency was to address pollution throughout the plastics lifecycle, from manufacturing and usage to disposal. Although the draft treaty included measures for phasing out harmful plastics, improving product design, tracking production, and cleaning up existing pollution, critics noted vague language and lack of legally binding commitments. Sea Shepherd warned that without strict regulations, especially regarding fishing gear, the treaty risked becoming ineffective. Meanwhile, its crews continued frontline cleanup efforts worldwide. ("Can a Treaty Stop the Ocean from Drowning in Plastic?," Sea Shepherd, 07 August 2025)

Roundtable discussion calls for urgent action to restore the Baltic Sea

On 07 August, ahead of The Ocean Race Europe start in Kiel, leaders from science, politics, and civil society convened for the "Making Waves-the Baltic Edition" roundtable. Participants warned that the Baltic Sea was suffering from decades of neglect and extensive pollution, citing dead zones the size of Denmark on the seabed. They called for a holistic, cross-border strategy to rehabilitate the ecosystem, urging reduced fishing pressure, better governance among the nine surrounding nations, and stronger public engagement. Delegates called for ecosystem-based fisheries management, increased funding for science, and improved communication of data and narratives to restore trust and spur policy change. Speakers emphasised that it was a moment of crisis and of opportunity to act with shared urgency. ("Making waves in Kiel: high-level roundtable calls for urgent action to restore the Baltic Sea," The Ocean Race, 07 August 2025)

Canada appoints Arctic ambassador to implement Arctic foreign policy

On 24 July, Canada appointed Virginia Mearns as a new senior Arctic ambassador. She was a Iqaluit resident with experience in Inuit governance, tasked with advancing Arctic interests in multilateral forums and non-Arctic states. Foreign Affairs Minister Anita Anand emphasised the appointment as part of a “full-court press” to defend Canadian sovereignty and implement its USD 35 million Arctic foreign policy, which included establishing new consulates in Alaska and Greenland. The move occurred amid heightened concern over Chinese activity. The Canadian military intensified surveillance of the dual-purpose Chinese icebreaker Xue Long 2, tracking its progress north of Alaska using CP-140 Aurora aircraft. Anand reaffirmed that the Canadian Armed Forces would continue to monitor the vessel to uphold Arctic sovereignty. (Dylan Robertson, "New Arctic ambassador will play key role in defending sovereignty: Anand," Global News, 24 July 2025)

ENERGY

Chile produces green hydrogen at its Antarctic research base

On 18 August, Quantum Commodity Intelligence reported that the Chilean Antarctic Institute (INACH) developed a hybrid system to generate green hydrogen on-site to power its Antarctic base. It would replace diesel generators with sustainable renewable sources. The system combined wind and solar energy, along with battery storage. This was to produce clean hydrogen directly where it was needed in the harsh polar environment. It marked a strategic shift toward energy independence and environmental responsibility in Antarctica. The innovation aimed to reduce reliance on fossil fuels, minimising logistical complexities and ecological risks associated with diesel

transport and spills. By integrating renewable generation with hydrogen production and storage, Chile showcased a concrete step toward decarbonising operations in remote polar regions. It also promoted sustainable scientific research infrastructure.

EXPEDITION

Endurance swim spotlights Mediterranean pollution amid global plastics talks

On 09 August, Endurance swimmer Noam Yaron attempted a 180 kilometres non-stop swim from Calvi to Monaco, using a wetsuit. This happened after him successfully campaigning to revise open-water rules to avoid sunscreen-related marine harm. The mission coincided with global plastics treaty negotiations in Geneva and aimed to highlight pollution in the Mediterranean. Accompanied by marine scientists, Yaron's team collected water and habitat samples throughout the challenge. The campaign underlined the pressing state of marine ecosystems, including plastic pollution, habitat degradation, and gaps in protected area enforcement. Tracking the emotional impact of confronting visible litter in waters, Yaron sought to engage public, business, and decision-maker awareness through sport as a platform for sustainability. (Rob Hutchins, "Health check: An endurance mission for the Mediterranean," Oceanographic, 09 August 2025)

China and Russia relaunch joint oceanographic expeditions amid Arctic ambitions

On 24 July 2025, China and Russia resumed their first joint maritime research mission in five years. This mission deployed 25 scientists aboard the research vessel Akademik M A Lavrentyev from Vladivostok. The 45-day expedition targeted environmental and climate studies in the Bering Sea and northwestern Pacific Ocean. The expedition also focused on changes over the past 126,000 years, including sediment transport from land to sea. Organised by China's First Institute of Oceanography and Russia's Pacific Oceanological Institute, the venture marked a renewed chapter in bilateral marine cooperation. Officials characterised the mission as a symbol of shared commitment to addressing climate change and enhancing ocean science. Researchers expected the findings to inform predictions on ecosystem, fisheries, and shipping impacts across the North Pacific–Arctic region. (Phoebe Zhang, "China, Russia relaunch joint maritime research missions, eyeing Arctic ambitions," South China Morning Post, 24 July 2025)

FOREIGN POLICY

One Big Beautiful Bill Act boosts US Arctic icebreaking and military capabilities

On 04 July 2025, US President Trump signed the "One Big Beautiful Bill Act" into law. This law was an expansive federal package that provided sweeping tax cuts and welfare rollbacks, while granting Alaska unique exemptions and Arctic-specific spending. The Act directed nearly USD 25 billion to the US Coast Guard, with close to USD nine billion allocated for strengthening Arctic operations. Funding included USD 4.3 billion for up to three heavy Polar Security Cutters, USD 3.5 billion for three Arctic Security Cutters, and USD 186 million for ten light and medium icebreaking vessels. The legislation also allocated billions toward Alaska's military infrastructure, such as radar upgrades, housing, and ongoing support under the Pacific Deterrence Initiative. Additionally, it opened lease sales in federally protected Arctic areas like

Arctic National Wildlife Refuge (ANWR) and increased royalties benefiting the state. (Birgitte Annie Hansen, "What the One Big Beautiful Bill Act Entails for the Arctic," High North News, 04 August 2025)

Greenland asserts "Work with us, not over us" at Arctic Summit

On 04 August, in the Arctic Encounter Summit held at Anchorage, Greenland's politicians emphasised that the future of Arctic governance must involve Greenland as an equal partner, not a passive subject. They conveyed that Greenland was open for collaboration,but not under decisions made "over us." The message underscored Greenland's growing foreign policy voice and its insistence on self-determination, even as other stakeholders convened from 27 countries. Greenland's MP Aaja Chemnitz Larsen invoked the motto "Nothing about us without us" to reaffirm that Greenland must have full agency over decisions affecting its land and people. The stance spotlighted a pivotal shift toward indigenous-led Arctic governance within international forums. (Birgitte Annie Hansen, "What the One Big Beautiful Bill Act Entails for the Arctic," High North News, 04 August 2025)

India deepens Arctic energy ties with Russia amid US trade pressure

On 01 August, Russia's Foreign Minister Sergei Lavrov revealed that Russia was pursuing joint energy extraction projects with India in the Russian Far East and Arctic regions. This was built upon successful collaborations in hydrocarbon delivery,particularly in supplying oil to India. The announcement came during bilateral talks in Moscow, held amid rising US tariffs of up to 50 per cent on Indian imports, imposed in response to India's continued Russian oil purchases. Both nations reaffirmed their strategic partnership and mutual interest in expanding trade ties, covering energy, agriculture, pharmaceuticals, and textiles. (Sitakanta Mishra, "India sets sail for Arctic waters with Russian partnership," Hindustan Times, 01 August 2025)

President Trump's Arctic strategy spurs China to eye Polar shipping routes

On 25 July, the South China Morning Post reported that US President Donald Trump's renewed push to acquire Greenland and strengthen Arctic infrastructure triggered debate among Chinese scholars about expanding their involvement in polar shipping. Analysts noted that China, as a "Near-Arctic State" and Arctic Council observer, was closely monitoring the Northern Sea Route (NSR), a faster link between Asia and Western Eurasia becoming navigable due to climate change. They argued that as Washington invested nearly USD 9 billion in icebreakers and Arctic security via the "One Big Beautiful Bill." Beijing should respond by leveraging Arctic passage to counter perceived US geopolitical containment. The discussion highlighted growing competition over Arctic maritime routes and strategic access. (Ji Siqi, "Trump's Arctic strategy stirs debate over China's polar shipping ambitions," South China Morning Post, 25 July 2025)

GENDER

UK's only female ice captain honoured with Merchant Navy Medal

On 03 September, Capt Philippa Bowden, the UK's only female ice captain, was honoured with the Merchant Navy Medal for her "ground-breaking" polar expeditions. At 36, Bowden already led voyages through the Ross and Weddell Seas and piloted

the largest cruise ship to operate in Antarctica. She earned her ice pilot license at 28. With this license she became the only British woman with an Unlimited Master's License, allowing her to command any ship worldwide. The medal, presented by Princess Anne, recognised her contributions to marine mammal observations and environmental protection. Bowden also mentored young female seafarers and served as an Arctic Ambassador. Her recognition coincided with Merchant Navy Day, a commemoration of the sacrifices of merchant seafarers during and after the World Wars. (Ethan Gudge, "'Ground-breaking' female ice captain honoured," BBC, 03 September 2025)

GEOPOLITICS

Podcast examines Trump's Greenland fixation amid China-Russia Arctic push

On 07 August, in the World Unpacked podcast, host Isaac Kardon and expert Alexander Gabuev unpacked rising geopolitical competition in the Arctic. They highlighted US distraction from the region. They discussed how President Trump's preoccupation with acquiring Greenland reflected broader anxiety over expanding China–Russia cooperation in the High North. The episode explored deepening Sino-Russian strategic alignment, warming-driven maritime access, and emerging alliances that could reshape Arctic balance of power. Speakers noted that Washington overlooked this evolving theatre, risking strategic disadvantage amid growing power alignment. The discussion emphasised Arctic importance to US security. It also emphasised the need for renewed policy focus and regional alliances to counterbalance the shifting geopolitical dynamics. (Isaac B Kardon and Alexander Gabuev, "Trump's Greenland Fixation and the China-Russia Strategic Opportunity in the Arctic," Carnegie Endowment for International Peace, 07 August 2025)

Arctic exceptionalism faces strain under growing geopolitical and environmental pressure

On 07 August, Australian Institute of International Affairs reported that the Arctic Council ceased multilateral operations following Russia's 2022 invasion of Ukraine. Following to that it halted 128 cooperative projects and marking a critical rupture in regional governance. Meanwhile, 2024 recorded the warmest year on record, triggering accelerated sea-ice decline. It revealed previously inaccessible Arctic routes with high economic potential. Notably, China declared itself a "Near-Arctic State" in 2018, signaling ambitions in shipping, tourism, and resource extraction-challenging traditional notions of Arctic isolation. The Council managed to transfer its chairship to Denmark, led by Greenland's Minister of Foreign Affairs, with a focus on climate, biodiversity, and marine conservation. The article warned that the Arctic Council must now rely on science diplomacy to restore consensus. It also emphasised to uphold its role as the Arctic's cornerstone forum. (Carol Dyck, ""Arctic Exceptionalism" in the Balance: Navigating new Geopolitical and Ecological Realities in the North," Australian Institute of International Affairs, 07 August 2025)

China criticises US's Arctic claim as 'villain strikes first' escalation

On 27 July, The US Coast Guard identified a Chinese research vessel, Xue Long 2, operating near Alaska. It also claimed it entered the US's Extended Continental Shelf (ECS). It considered to be an assertion not recognised by international law. The agency released photos of the vessel, characterising the

incident as an onset of a "villain strikes first" scenario. Global Times criticised the US portrayal, noting that the ECS designation was a unilateral expansion of US maritime claims by roughly one million square kilometers. The newspaper described the incident as political posturing rather than a violation. It also argued that the US was using its exaggerated territorial claim to rationalise confrontation in the Arctic. (Fan Anqi, "US plays 'villain strikes first' game as it hypes Chinese research vessel inside its self-claimed territory," Global Times, 27 July 2025)

GLACIER AND ICE SHEET DYNAMICS

85 new subglacial lakes discovered beneath Antarctica

On 19 September, using a decade of CryoSat satellite data (2010–2020), researchers have identified 85 previously unknown subglacial lakes beneath Antarctica. It increased the total known active lakes to 231. These lakes, which periodically fill and drain, influence ice sheet dynamics and global sea level rise. Mapping their cycles improves understanding of Antarctic subglacial hydrology, critical for climate and ice-sheet models. The findings highlighted the dynamic nature of Antarctic ice and the importance of ongoing satellite monitoring to predict future sea-level changes. ("85 new subglacial lakes detected below Antarctica," The European Space Agency, 19 September 2025)

Reversing Antarctic Sea ice loss depends on ocean layering

On 21 September, Phys.org reported on the study by Sirui Li and colleagues finding the recovery of Antarctic Sea ice is influenced not only by carbon dioxide emissions but also by the stratification of the Southern Ocean. Strong stratification traps heat near the surface, accelerating ice melt even if Carbon-di-oxide levels drop, whereas weaker stratification allows heat to mix downward, promoting ice recovery. Observations and climate models show that reversing ice loss is possible, but only if emissions are reduced soon and stratification remains favourable. The research highlights the need for better monitoring of ocean temperature, salinity, meltwater, and winds. (Hannah Bird, "Reversing Antarctic sea ice loss depends on ocean layering, study finds," Phys.org, 21 September 2025)

Antarctic ice growth shape early Indian monsoon, fossils in Nagaland suggest

On 07 September, scientists discovered well-preserved fossil leaves in Nagaland's Laisong Formation, dating back about 34 million years. The findings suggested the region once had warm, wet conditions. Researchers from Birbal Sahni Institute of Palaeosciences and Wadia Institute of Himalayan Geology reconstructed that climate and found striking rainfall and temperature levels. They linked this period to the time when Antarctica first developed massive ice sheets. That Antarctic glaciation appeared to have reshaped global wind and precipitation patterns, shifting the Intertropical Convergence Zone (ITCZ) from the South Pole toward the tropics. The resulting shift delivered intensified monsoonal rains over northeast India and played a role in the evolution of the Indian monsoon system. The research was published in Palaeogeography, Palaeoclimatology, Palaeoecology. ("Fossil leaves from Nagaland reveal how Antarctica shaped the Indian Monsoons," Department of Science & Technology)

Unique concept is implemented to observe the Arctic sea ice

On 09 September, Phys.org reported that the Polarstern recently concluded a two-month expedition in the central Arctic, focusing on the summer melting of sea ice across three distinct regimes. Led by the Alfred Wegener Institute, the team conducted detailed analyses using autonomous measuring stations and cameras to monitor ice conditions and biological communities. Surprisingly, they found a scarcity of ice algae, even in areas with minimal melt, suggesting potential shifts in Arctic ecosystems. The study also revealed unusually low sea ice concentrations and thinner ice, averaging 1.5 metres, likely due to spring winds dispersing the ice. These findings underscore the dynamic nature of Arctic sea ice and its ecological implications. (Alfred Wegener Institute, "Unique concept for observing Arctic sea ice successfully implemented," Phys.org, 09 September 2025)

Swiss villages face rising threat as glaciers melt and mountains shift

On 08 September, Swiss alpine villages are facing mounting danger as melting glaciers destabilise the surrounding mountains, triggering landslides, rockfalls, and floods. Scientists explained that rising global temperatures are accelerating ice loss in the Alps, weakening once-frozen rock and releasing large volumes of water. This destabilisation forced some communities to evacuate and pushed authorities to reinforce protective barriers, install warning systems, and closely monitor high-risk zones. Residents described the growing anxiety of living under constant threat, as climate change reshapes both their daily lives and traditional livelihoods. Experts warned that the pace of glacier retreat is unprecedented, leaving little time for adaptation. The crisis underscores the urgent global need to address warming before more communities are put at risk. (Jade Levin, "Swiss villages threatened by melting glaciers," France24, 08 September 2025)

Antarctica's megaberg A23a nears end in South Atlantic

On 08 September, Earth.com reported that Antarctica's megaberg A23a, one of the largest icebergs ever recorded, entered its final phase in the South Atlantic after nearly four decades. Having calved from the Filchner-Ronne Ice Shelf in 1986, it remained grounded in the Weddell Sea for over 30 years before being freed in 2020. By early 2025, the iceberg drifted near South Georgia Island, raising concerns about potential disruptions to local wildlife. In recent weeks, satellite images revealed significant calving events, with vast slabs breaking off and smaller fragments dispersing, posing hazards to ships. Experts noted that the warming seas and increased drift speeds were accelerating its disintegration, making it increasingly difficult to track and study. (Andrei Ionescu, "Antarctica's megaberg faces its final days in the South Atlantic," Earth.com, 08 September 2025)

World's largest iceberg breaks up into massive fragments

On 02 September, See News reported that the scientists tracked the disintegration of Iceberg A23. It was once the largest iceberg afloat, as it fragmented into massive chunks. The iceberg lost approximately 36 per cent of its surface area this year, with three fragments between 60 and 300 square kilometres breaking away during the Antarctic winter. A23a calved from the Filchner-Ronne Ice Shelf in 1986 and remained grounded until 2023. It resumed drifting and, by July, reduced in size from around 2,730 square kilometres to nearly 1,750 square kilometres. By early September, it shrunk to approximately 1,700 square

kilometres less than half its original size, and was rapidly breaking up in warmer waters north of South Georgia Island. Observers warned that such accelerated fragmentation mirrored broader warming-driven ice loss across Antarctica. (Rana Atef, "World's Biggest Iceberg Breaking Apart Amid Climate Change," See News, 02 September 2025)

RESEARCH & DEVELOPMENT

US Arctic research consortium shuts down amid funding cuts

On 29 September, the Arctic Research Consortium of the United States (ARCUS) will close at the end of September 2025. This action followed losing major funding from the National Science Foundation, cut by 56 per cent under the Trump Administration. Founded in 1988, ARCUS connected Arctic researchers, universities, and Indigenous communities. It also supported initiatives such as the Sea Ice for Walrus Outlook, which providing weekly ice and wildlife updates to Alaskan subsistence hunters. Experts warned that the closure signaling a broader pivot of US Arctic research toward security and energy priorities, risking the loss of scientific and Indigenous knowledge crucial for policy decisions. Observers caution that other US Arctic research institutions could also face shutdowns in coming years. (Birgitte Annie Hansen, "US Arctic Research Consortium Shuts Down," High North News, 29 September 2025)

Arctic research hub closes as NSF funding slashed

On 19 September, Inside Climate News reported that nearly after 40 years, the Arctic Research Consortium of the United States (ARCUS) was set to close on 30 September. This closure was due to the steep federal budget cuts. ARCUS relied on the National Science Foundation for 93 per cent of its 2023 funding, about USD 1.7 million, but the NSF declined to renew a key community hub grant. President Trump's proposed budget aimed to cut NSF funding by 56 per cent, from USD 9 billion to USD 3.9 billion. ARCUS's board, unable to secure alternative support, recommended a structured shutdown, citing long-standing funding challenges. The organisation connected Arctic scientists, communities, and funding sources, and managed initiatives such as sea ice forecasting and Indigenous scholars programs. (Lisa Sorg, "After Trump Cut the National Science Foundation by 56 Percent, a Venerable Arctic Research Center Closes Its Doors," Inside Climate News, 19 September 2025)

Antarctic research enhances astronaut health monitoring

On 15 September, Australian Antarctic expeditioners participated in a groundbreaking study to monitor cognitive and physiological changes during extended isolation, providing valuable insights for future space missions. The research involved monthly cognitive tests and the use of biosensors to track heart rate, sleep, and movement, mirroring protocols used on the International Space Station. Collaborating with the University of Pennsylvania, the team aimed to integrate these data into a comprehensive model to better understand the effects of prolonged confinement on human health. This initiative underscored the critical role of Antarctic environments in preparing for the challenges of long-duration space exploration. ("Astronauts to benefit from brain tests in Antarctica," Australian Government, 15 September 2025)

Ghana expands coastal protection with landmark fisheries law

On 22 August, Blue Ventures reported that Ghana enacted the Fisheries and Aquaculture Act (Act 1146), extending inshore protection for artisanal fishers and tightening controls on illegal trawling. President John Dramani Mahama signed the law after parliamentary approval in July. It marked a transformative advance for small-scale fishing communities. The legislation doubled the Inshore Exclusive Zone from six to twelve nautical miles, established an independent Fisheries Commission, increased penalties for unlawful fishing, and improved welfare standards for

crewmembers—actions. These measures were uintended to reverse dramatic declines in small pelagic fish stocks. The act positioned Ghana as a leader in West African fisheries reform, with implications for food security and livelihoods. Blue Ventures noted that the law elevated community governance and called on neighboring countries to follow suit. ("Ghana expands coastal protection in landmark fisheries law," Blue Ventures, 22 August 2025)

Scientists retrieve Antarctic seabed mud to study climate and ocean history

On 19 August, BBC reported that an international team of researchers collected more than 40 long cores of seabed sediment from the Antarctic Peninsula earlier in 2025. They were collected using a ship-tethered coring drill that reached depths up to 500 metres. The samples were frozen and transported to the University of Barcelona, then distributed to institutions worldwide. Scientists planned to analyse microbial life, carbon storage, and pollution levels, while also using environmental DNA to trace how nearly a century of industrial whaling affected marine ecosystems and carbon cycling. The work formed part of the Convex Seascape Survey, a global mission to link ocean processes with climate history. Findings were expected to reveal how Antarctic ecosystems and whale populations influenced carbon storage and climate regulation. (Victoria Gill, "Why scientists hope seabed mud could reveal Antarctic Ocean secrets," BBC, 19 August 2025)

Arctic Bioscience reports improved visual field from herring caviar oil

On 18 August, Arctic Bioscience announced that a clinical study published in International Ophthalmology showed that daily supplementation with ROMEGA herring caviar oil significantly improved the visual field measurement Mean Deviation (MD) in patients with primary open-angle glaucoma (POAG) who controlled intraocular pressure (IOP). The three-month study included 50 patients, and those in the intervention group received a 500 mg daily ROMEGA capsule. The intervention group demonstrated a statistically significant improvement in MD, whereas the control group showed no similar gain. Best-corrected visual acuity and retinal nerve fiber layer thickness remained stable, IOP was maintained, no adverse events were observed, and the treatment was well tolerated. The company planned larger studies to confirm these promising results. ("Arctic Bioscience - Achieves significant vision improvement in Clinical Glaucoma Study," Reuters, 18 August 2025)

UK scientists raise alarm over marine stress from ocean carbon capture

On 14 August, UK scientists cautioned that ocean-based carbon capture technologies could impose stress on marine life. They also highlighted the need for comprehensive environmental assessments before large-scale deployment. Techniques such as ocean alkalinity enhancement, where alkaline substances are added to seawater to boost Carbon-di-oxide absorption. This showed promise for mitigating climate change, with companies like Ebb Carbon, Planetary Technologies, and Equatic pursuing pilot programs. However, researchers warned that altering ocean chemistry might disrupt marine ecosystems. Possibly it would precipitate pollutants or harm organisms in unpredictable ways. They emphasised that regulatory frameworks had not urge stricter oversight. The scientists advocated combining engineered carbon removal with natural restoration methods. They stressed that while carbon removal was necessary alongside emission reductions, uncertainties about its safety and effectiveness could limit its adoption. (Aniqah Majid, "Ocean carbon capture raises concerns over marine stress, say UK scientists," The Chemical Engineer, 14 August 2025)

SCIENCE & TECHNOLOGY

MIT engineer highlights Arctic operational challenges and innovations

On 17 September, MIT News reported that David Whelihan of MIT Lincoln Laboratory travelling to the Arctic during Operation Ice Camp missions sponsored by the US Navy. Over the past few years, he and his team tested low-cost sensor nodes designed to monitor sea ice loss in extent and thickness. At the 2024 camp, they developed deployable and recoverable sensors, wearable systems for automatic Wi-Fi data transfer, and explored UAVs as "data mules." Whelihan recalled harsh conditions, with temperatures dropping to minus 30 degrees and tents losing heat as snow blocked airflow. He described logistical challenges, from flying into Prudhoe Bay and onward by small planes to survival training and calorie-intensive routines. He also emphasised that Arctic research required robust technology and human endurance. (Ariana Tantillo, "Q&A: On the challenges of operating in the Arctic," MIT News, 7 September 2025)

SHIPPING

South Korea accelerates Arctic shipping ambitions with icebreaker investments and port expansion

On 15 September, South Korea was intensifying its Arctic shipping initiatives by allocating 1.66 trillion won to enhance the Port of Busan's infrastructure.It aimed to accommodate increasing Arctic traffic. Additionally, the government plans to invest 549 billion won in developing new icebreakers by 2030. To further bolster its capabilities, South Korea will subsidise the construction of ice-class vessels, offering 11 billion won per ship built for Arctic operations. This strategic move positioned South Korea as a key player in the evolving Arctic shipping landscape, leveraging its shipbuilding expertise and strategic port location. (Malte Humpert, "South Korea to Subsidize Construction of Ice-class Vessels and Expand Port in Support of Arctic Shipping," High North News, 15 September 2025)

Increasing Russia-China relations drive Arctic shipping

On 10 September, the Arctic transit shipping was shaped by the growing economic partnership between Russia and China. Between June and August 2025, 52 voyages transported roughly 1.3 million tonnes of cargo, up from 48 the previous year. Most shipments either originated or ended in Russia or China, with a few involving South Korea. Cargo primarily included oil, gas, and iron ore, with 13 oil tankers moving around 5.5 million barrels of crude oil from Murmansk and Baltic Sea ports to China. Two sanctioned LNG carriers also departed for China. Container shipping along the Northern Sea Route rose, linking Chinese ports like Shanghai with Russian ports such as St. Petersburg. Eastbound flows dominate, highlighting strategic alignment in Arctic trade. (Malte Humpert, "Deepening Russia-China Relations Continue to Drive Oil, Gas, and Container Traffic Along Arctic Shipping Lane," High North News, 10 September 2025)

China pushes polar shipping routes to sidestep global choke points

On 09 September, Bloomberg reported that China expanded express shipping through Arctic ice lanes to avoid traditional maritime chokepoints. The newsletter noted that Chinese firms were increasingly using the Northern Sea Route to shorten transit times to Europe amid intensifying trade war pressures. The move illustrated Beijing's determination to diversify supply chains

and reduce reliance on routes vulnerable to geopolitical tension. Analysts observed that although risks from severe weather, ice navigation, and regulatory uncertainty remained high, shipping through the Arctic was gaining hold due to its potential to lower costs and transit times. The report concluded that these developments could reshape global trade routes if Arctic navigation becomes more reliable. (Brenden Murray, "New Arctic Ship Service Caters to Rising China-Europe Trade," Bloomberg, 09 September 2025)

Germany docks supply vessel in Nuuk ahead of Arctic solidarity visit

On 18 August, Germany docked its large naval supply ship named Berlin, at Nuuk, Greenland, marking the first-ever port call of a German navy vessel in the territory. The 175 metres ship carried fuel, medical facilities, and two helicopters. It was set to participate in Arctic naval exercises later that month. Danish Defence Minister Troels Lund Poulsen described the visit as a clear signal of European solidarity and growing focus on Greenland. Germany also planned to join NATO-aligned security operations in the area, including Arctic defence collaborations with Denmark, Canada, and Norway. (Magnus Lund Nielsen, "Berlin docks in Greenland ahead of Pistorius arctic solidarity trip," Euractiv, 18 August 2025)

Chinese shipping firm cut transit to Europe via 18-Day Arctic route

On 18 August, a Chinese operator launched the first liner-type container service via the Arctic, named the China–Europe Arctic Express, which connected Qingdao and Shanghai with Ningbo–Zhoushan and European ports Felixstowe, Rotterdam, Hamburg, and Gdansk. The Arctic journey, traversing the Northern Sea Route from Ningbo to Felixstowe, took 18 days-less than half the time of conventional Suez Canal voyages. The inaugural voyage was scheduled on 20 September 2025 and was fully booked. The 4,890-TEU Istanbul Bridge, a low ice-class container ship, was used. The route was planned to be seasonal until ice-class vessels could extend operations into winter and spring. China's Ministry of Transport began releasing live sea-ice monitoring data to support safer Arctic navigation. (Malte Humpert, "China Launches 18-Day Arctic Express Containership Route to Europe with Stops in UK, Germany, Poland," High North News, 18 August 2025)

Antarctic tourism surge raises environmental concerns

On 21 September, TTW reported that Antarctica is seeing a rise in visitors, from around 8,000 in 1994-95 to over 1,22,000 in 2023-24, driven by "last chance tourism" and social media exposure. Most tourists arrive during the Antarctic summer via cruise ships, engaging in activities like glacier walks and wildlife viewing. The surge threatens fragile ecosystems, disturbs wildlife, and raises pollution and safety risks. Regulatory oversight remains fragmented, though organisations like nternational Association of Antarctica Tour Operators (IAATO) and some national policies, for example New Zealand's Ross Sea observer program attempt to maintain standards. Experts call for visitor caps, restricted landing zones, and better scientific monitoring to balance tourism with conservation. ("Antarctic Tourism Surge Sparks

Environmental Concerns Amid Growing Demand," TTW, 21 September)

Greenland tourism soars as new flights begin to Nuuk

On 17 August, Travel and Tour World reported that Greenland experienced a surge in tourism after United Airlines launched direct seasonal flights from Newark to Nuuk in June 2025. It was expected to improve accessibility and transform Nuuk into a vital Arctic entry point. The new route eliminated the need for multiple connections via Europe and prompted excitement among locals and visitors. Despite growing demand, Greenland's tourism infrastructure struggled to cope, Nuuk had fewer than 600 hotel beds, and extreme weather frequently disrupted travel plans, leaving some travelers stranded in makeshift accommodations. Projects were underway to expand tourism capacity, including the development of new airports in Ilulissat and Qaqortoq, expected by 2026. A government-backed 10-year plan aimed at doubling visitor numbers to 2035 by extending the season and dispersing tourists across the region. ("Greenland Tourism Soars with New Flights to Nuuk: Is the Arctic Ready for a Surge?," Travel and Tour World, 17 August 2025)

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