

The Arctic Ocean Regional Alliance (ArORA) Plan and Implementation Strategy

EXECUTIVE SUMMARY

A coordinated network of sustained observations is needed to monitor the Arctic Ocean, and surrounding seas and waters. This is necessary to determine how rapid environmental changes affect marine ecosystems, coastal Arctic Indigenous and other communities, climate and weather-related hazards, infrastructures and economic activities in the Arctic and elsewhere. There is an urgent need for a regional alliance, the need for which is recognized by the United Nations' Global Ocean Observing System (GOOS) and by the Arctic Council's Sustaining Arctic Observing Network (SAON). This document presents a draft plan for the Arctic Ocean Regional Alliance (ArORA) developed by a team of ocean experts from 15 countries, and through public review. Going forward ArORA will be considered for adoption as an Arctic Ocean observing alliance within the structures of GOOS and SAON.

Establishing an international structure for coordination and collaboration is a critical first step towards providing a pan-Arctic overview of marine observing activities and a service to foster optimization of observing infrastructure and human resources. Most ocean observations in the Arctic are funded on a short-term basis, making it difficult to coordinate, build and sustain the long-term efforts required to address ongoing and emerging challenges and to deliver scientifically validated evidence and baseline information to support management and policy decisions and provide societal benefit.

The ArORA Plan and Implementation Strategy is organized into four main parts:

I - Motivation and Background: Situates the need for ArORA in the context of current climate and environmental change in the Arctic, and relevant and ongoing global ocean and Arctic observing programs. It provides an overview of the history of ArORA's development including outcomes from workshops and planning meetings and the activities of the Task Team that prepared this document.

II – Scope: ArORA adopts the geographical definition of the Arctic Ocean and its marginal seas developed by the Arctic Monitoring and Assessment Programme (AMAP) and seeks to facilitate communication and coordination across diverse rightsholder and stakeholder groups with a vested interest in Arctic Ocean observing.

III - Objectives and Functionality: A set of core objectives and short- and medium-term activities anchor ArORA, serving to guide the growth and evolution of the alliance. In summary, the goals are to a) Coordinate and align Arctic marine observing efforts, b) Ensure observing systems meet diverse user needs, c) Ensure permanent, meaningful Indigenous presence in governance and planning and d) Advance knowledge sharing and data stewardship.

Short- and medium-term activities are proposed to meet the needs of diverse stakeholders and rightsholders while advancing the overarching goals of the alliance. Short-term (1-2 years) activities focus on ArORA development, growing the ArORA community and understanding the scope of observing activity. They include developing partnerships with existing organizations and initiatives to support Indigenous- and community-led observing networks and supporting International Polar Year (IPY-5) planning. Medium-term activities (2-5 years) expand to include development of concepts for a sustained core Arctic Ocean observing system, supporting rightsholder and stakeholder engagement and maintaining and promoting best practices and methodologies for Arctic Ocean observing.

IV - Structure and Governance: The ArORA governance framework requires a multi-faceted approach balancing the diverse interests of Arctic nations, Indigenous Peoples, research institutions, and international bodies. It is grounded in international collaboration, shared principles, best practices, and a commitment to equity. All members are encouraged to participate in this process and to consider ways in which they may play an active and leading role in supporting ArORA.

ArORA is founded on shared principles for Arctic Ocean observing that address people, planet and information. Observing should provide societal benefit, be inclusive, and prioritize co-production of knowledge. Open data, data stewardship and interoperability along with Indigenous data sovereignty are key as are sustained operation and scalability - the opportunity to scale the organization as needs and activities change over time.

The proposed governance structure for the ArORA includes a Steering Group with executive function, a Council to provide technical and scientific guidance and a Secretariat to support ArORA functions and activities including acquisition of funding. Governance will include representatives from across sectors and organizations that are active in the Arctic observing community, the Arctic states, Indigenous governments and organizations, and other nations that have an interest or significant contribution to Arctic Ocean observation.

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I - MOTIVATION AND BACKGROUND

The Arctic is experiencing rapid environmental change, with the lower atmosphere warming nearly four times faster than the 1979-2021 global average (Rantanen et al. 2022), with severe impacts to terrestrial and marine ecosystems, and to the Arctic Indigenous and other local communities that depend on them. In the Arctic marine environment, these changes include warming ocean temperatures (Polyakov et al., 2025), ocean acidification (AMAP OA 2013:2018), harmful algal blooms (HABS) (Anderson et al., 2022), rapid decline in summertime sea ice extent (Jahn et al., 2024), changes in sea ice quality and age (Sumata et al., 2023), lengthening summertime open water period (Stroeve et al., 2014; Crawford et al., 2021), changes in upper ocean stratification and freshwater content (Solomon et al., 2021; Zanowski et al., 2021; Le Bras and Timmermans, 2025), and increased surface wave activity (Thomson and Rogers, 2014; Cooper et al., 2022). These changes threaten marine life, food security and human well-being, amplify climate- and weather-related hazards, and affect planning for transportation, industry/economic activities and infrastructure development. Moreover, the Arctic plays a critical role in the Earth's climate system, modulating weather and climate at lower latitudes. These impacts, combined with growing geopolitical interest in the Arctic region, lend unprecedented urgency to efforts to quantify, understand and predict Arctic environmental change and to the need to improve sharing of data, and knowledge about the state of the Arctic Ocean and the wider Arctic marine environment.

The Global Ocean Observing System ([GOOS](#)), a program of the Intergovernmental Oceanographic Commission ([IOC](#)), co-sponsored by the World Meteorological Organization ([WMO](#)), the UN Environment Programme ([UNEP](#)) and the International Science Council ([ISC](#)), provides an overarching framework for developing and maintaining an ocean observing system to support sustainable development, safety and well-being. The GOOS structure includes global observing networks of particular interest for the Arctic. Examples of these are the [Argo](#) profiling float network and the [GO-SHIP](#) program for long-term hydrographic measurements, the Voluntary Observing Ships ([VOS](#)), network and Ship of Opportunity Programme ([SOOP](#)), the network of animal-borne ocean sensors ([ANIBOS](#)), and the [Ocean Gliders](#). These come together under GOOS to create an integrated, fit-for-purpose observing system by working to define observing system needs, agree on standards and best practices, and contribute to a common strategy for data management and a metadata information system. Engagement with governments, both globally and regionally, is carried out within the GOOS framework and governing structure, with GOOS Regional Alliances (GRAs) and regional experts of the GOOS Steering Committee working to scale global to regional implementation. The regional alliances share a focus on promoting and coordinating ocean observing, and on translating GOOS strategy, structure and programs into tangible products that address local and regional priorities. The Southern Ocean Observing System (SOOS) is the operational regional structure for planning and coordinating Southern Ocean observations. In contrast, there is no pan-Arctic regional alliance for ocean observations, though the need for one is recognized by GOOS and the Sustaining Arctic Observing Networks (SAON), and the wider Arctic observing community, positioning an Arctic Ocean Regional Alliance (ArORA) to fill this role.

Sustained observations, distributed throughout the Arctic marine research, operational warning/forecasting communities and Arctic Indigenous communities, underpin efforts to understand and predict change. These observations feed into analyses and products that inform community and societal response at all levels, from daily activity planning and local travel to long-term regional development and international, pan-Arctic strategies for security and climate resilience. Currently, such observations are typically planned and implemented nationally, through research projects, or

social enterprise. These efforts serve identified needs and regulatory requirements and are mostly resourced through intermittent, time-limited (3-5 year) project-specific funding coordinated at the national, and occasionally international, level and sometimes through the private sector. While this model has supported a range of successful observing efforts within limited scope/mandates, the absence of stable, long-term structures and support creates severe challenges.

The difficulty of repeatedly connecting short-term support over decades has led to inconsistent execution of measurements and, worse, to significant gaps in critical time series needed for future projections. The constantly changing landscape of projects and funding opportunities makes it difficult to sustain the long-term collaborations needed over decadal timescales. This impedes establishing and maintaining the structures needed to reliably deliver information and knowledge to support sustainable development, the well-being of Arctic Indigenous Peoples and their capacity for sustaining local observations, and the stewardship of healthy Arctic marine ecosystems. These challenges are especially severe when needs span national boundaries, where consistent, long-term planning and coordination are critical to the success of the Arctic Ocean observing system. Geopolitical constraints also play an increasing role in limiting collaboration and data exchange. Although Arctic Ocean science receives planning and coordination support from SAON and the International Arctic Science Committee (IASC), both these organizations have broader mandates that extend beyond ocean science. Given the critical role of the Arctic Ocean and adjacent seas in regional and global systems, a complementary entity dedicated specifically to sustained Arctic marine observing is essential.

The ArORA, acting within the frameworks of GOOS and SAON, will be a stable, long-term coordination center for the Arctic Ocean observing community, facilitating communication and planning across national boundaries, data and knowledge providers, and users of marine environmental information (Fig.1). ArORA will respond to and feed into existing and emerging regional, national, and international Arctic Ocean-relevant initiatives ensuring visible complementarity rather than duplication.



Figure 1. The ArORA, encompassing many of the diverse rightsholder and stakeholder groups of the Arctic Ocean observing community and the whole suite of ocean observing activities from satellite-derived observations to the observations of individuals in coastal communities.

Beyond serving to connect the broader Arctic observing community, ArORA will strengthen ties among Arctic marine researchers, communities, and operational agencies through shared needs for data and understanding. ArORA will enable better integration and coordination across the full value chain supporting the data- and knowledge-based understanding of Arctic marine change—from observation to modelling to end users. ArORA will promote the sharing and curation of standard methodologies and best practices to operationalize the GOOS Essential Ocean Variables (EOVs), Global Climate Observing System (GCOS), Essential Climate Variables (ECV), as well as Shared Arctic Variables (SAVs) through engagement with the SAON-ROADS process. These are all important elements of a pan-Arctic marine observing network - allowing confident analysis and interpretation of both quantitative and qualitative observations and improving data interoperability across diverse observing system specific and national architectures. An Arctic Ocean regional alliance could collaborate with global ocean observing networks to promote and support their expansion into the Arctic. ArORA will provide a clear voice for Arctic Ocean observing within GOOS and complement the work of the GOOS Observations Coordination Group by developing integrated observing system approaches for the Arctic.

ArORA INITIATION AND DEVELOPMENT

Discussion of the need for an internationally coordinated system for ocean observing in the Arctic has been ongoing since the 1990s, including discussions via the GOOS and European Global Ocean Observing System (EuroGOOS) community (Sandven *et al.*, 2005), and at all Arctic Observing Summits since inception in 2013 (Fischer, 2013; Buch *et al.*, 2018, Sagen *et al.* 2020; Starkweather *et al.*, 2020). These initiatives saw varying progress and success. Geopolitics shaped plans for implementation of an Arctic Ocean alliance, pointing to a SOOS-like structure hosted outside of GOOS, but functioning as a regional alliance with membership in the GOOS Regional Alliance Council. The ArORA initiative has developed over four years, following a timeline intentionally extended to promote broad engagement with representatives from Indigenous and coastal communities that pointed to the need for a slower process that allowed time for relationship building.

Efforts began at the 6th Arctic Observing Summit (AOS) 2022 (Tromsø, Norway) with a review of existing observing activities and networks, followed by a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis (Fig. 2) conducted during an online exploratory workshop prior to a roundtable discussion at Arctic Science Summit Week (ASSW) 2023 (Vienna, Austria), bringing together many key stakeholders, networks, programs and initiatives from the international Arctic Ocean observing community. Discussions at ASSW 2023 led to the formation of a task team to develop this plan for ArORA.

GOOS and SAON extended formal recognition to the ArORA Task Team in April 2024, with the goal of producing an ArORA implementation strategy for their consideration. SAON agreed to support the ArORA within its framework, with the flexibility to move the organization to sit directly within GOOS or assume another structure in the future. The Task Team's efforts were recognized by the G7 Future of Seas and Ocean Initiative (FSOI). The FSOI 2025 list of priorities encouraged the continued engagement of G7 experts in the Task Team to develop a strategy, implementation plan, and governance structure and to identify project office needs for implementing ArORA as an Arctic Ocean observing alliance in collaboration with SAON and GOOS (<https://www.g7fsoi.org/activities/>). In 2024 the Task Team established terms of reference and, in parallel with continuing efforts to broaden representation, began drafting the implementation plan in spring 2025 (<https://goosocean.org/arora-task-team/>).

This plan underwent open community review in early 2026 to ensure broad participation in its development. Following this process, ArORA will be considered by GOOS and SAON for implementation as an Arctic Ocean Regional Alliance (RA) within GOOS.

<p>STRENGTHS</p> <ul style="list-style-type: none"> • Independence • Diverse activities • Flexibility • Low coordination cost • Effective for proces studies • Some existing Arctic coordination bodies 	<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • UNDOS Arctic Action Plan • Advance existing, well-established observing frameworks • Build on legacy of IPY4 • Align activity to collective priorities • Develop framework for best practices • Connect to and strengthen representation in international bodies - e.g. GOOS, POGO, GEO Blue Planet • Identify and meet needs of key users • Leverage private sector and other resources • Replicate existing models of coordination - other RAs
<p>WEAKNESSES</p> <ul style="list-style-type: none"> • Lack of clear leadership and shared vision • Difficult to coordinate across national boundaries • Limited ability to achieve broad coverage • Challenged to leverage efficiencies, sustain observations • Timely delivery of data • Weak agreement on standards and practices • Weak coordination with global observing efforts • Limited influence on international organizations • Diffuse efforts to partner with Indigenous organizations 	<p>THREATS</p> <ul style="list-style-type: none"> • Geopolitical instabilities and tensions • Failure to obtain formal recognition from IOC • National political priorities • Loss of resources • Cost of operations • Overabundance of existing coordination bodies • Failure to communicate objectives and opportunities effectively

Figure 2. Summary of the SWOT analysis conducted for the ASSW 2023 workshop. Analysis focused on the existing model for coordination of Arctic marine sector observing.

II - SCOPE

GEOGRAPHIC AND FUNCTIONAL DOMAIN

ArORA’s pan-Arctic nature and spectrum of rightsholders and stakeholders dictates broad geographic and functional domains. ArORA thus adopts the geographical definition of the Arctic developed by the Arctic Monitoring and Assessment Programme (AMAP) (Fig.3), ranging from the shallow coastal regions into the deep basin, and from the central Arctic Ocean to the Subarctic regions on the periphery. The functional domain is consistent with ArORA’s envisioned role as a hub for communication and includes activities, infrastructure, coordination, and collaboration mechanisms that contribute to the Arctic marine observing efforts across disciplines, sectors, and scales.



Figure 3. The AMAP geographic Arctic domain encompassing the Arctic Ocean and its marginal/neighboring seas (<https://www.amap.no/about/geographical-coverage>).

COMMUNITY

ArORA aims to facilitate communication and coordination across diverse rightsholder and stakeholder groups. It is composed of members from those same groups who are united in a vested interest in Arctic Ocean observing. These include, but are not limited to:

- Research (academia, government, Indigenous organizations)
- Indigenous and Tribal Peoples
- Coastal Communities and Municipalities
- Operational Agencies and Authorities
- Industry and Private Sector
- Non-Governmental Organizations
- Policy and Decision Makers
- Coordination Bodies
- Funding Entities

These communities contribute complementary expertise and capabilities while also having specific data and information needs. Taken as a whole, they represent the ocean observing value chain, spanning resource providers, supporting entities, planners, practitioners, analysts and beneficiaries, with most entities occupying multiple roles. ArORA aims to bridge the interests of these diverse communities for the conceptualization, planning and execution of Arctic Ocean observing efforts.

III - OBJECTIVES AND FUNCTIONALITY

ArORA will unify currently fragmented marine observing initiatives across the Arctic. By providing consistent, long-term coordination ArORA will bridge gaps between existing programs, ensuring that communication, and collaborative international planning is not only maintained but strengthened and optimized. Rather than duplicating efforts, ArORA will complement established bodies by creating opportunities for international collaboration, connecting rightsholders and stakeholders, promoting interoperable data products, and aligning activities with established global ocean observing programs.

A top priority is amplification of Indigenous voices by ensuring a permanent and meaningful presence, supporting Indigenous-led initiatives, and empowering Indigenous-led community-based observing efforts in ways that uphold and strengthen Indigenous rights and data sovereignty.

OBJECTIVES

A set of core objectives anchor ArORA, serving to guide its activities as the alliance grows and evolves. These overarching objectives leverage the broad community base upon which the alliance is built, tapping the wide range of perspectives, expertise and skills to:

- **Coordinate and align Arctic marine observing efforts**
 - Integrate national and regional initiatives into a pan-Arctic framework,
 - Reduce duplication and identify synergies,
 - Support implementation of strategic initiatives.
- **Ensure observing systems meet diverse user needs**
 - Embed rightsholders and stakeholders in planning and execution,
 - Facilitate assessment of observing system efficacy including data coverage,
 - Maintain and grow observing capacity,
 - Facilitate sustained core ocean observing systems and link to global frameworks.
- **Embed Indigenous Leadership and Knowledge Systems**
 - Ensure permanent, meaningful Indigenous presence in governance and planning,
 - Support Indigenous-led observing and data sovereignty,
 - Co-create initiatives and pathways for influencing research directions and priorities,
 - Jointly translate Arctic Council Permanent Participant protocols into best practices.
- **Advance Knowledge Sharing and Data Stewardship**
 - Promote resource sharing and interdisciplinary collaboration,
 - Harmonize data practices and strengthen open platforms aligned with FAIR, CARE, and TRUST principles.

ArORA's functionality stems from these core objectives, with short-, medium-, and long-term activities (tasks, actions) intended to meet the needs of stakeholders and rightsholders and advance the overarching goals. To remain relevant and effective over time, ArORA will operate within a flexible framework capable of evolving in response to the changing Arctic Ocean observing landscape and global initiatives.

The development of ArORA will be an iterative process of learning how best to serve the ArORA community, adapting to shifting priorities, while welcoming new members and collaborations. The ASSW workshops, which helped shape the plans presented here, mark the first steps in this process. Guided by its core objectives, ArORA will embrace fluidity in membership and needs, driving continuous refinement in its functionality and services.

ArORA PHASED ACTION PLAN

To design and implement coordinated efforts and estimate the required resources, activities addressing the above objectives have been defined as start-up (first 2 years) and medium-term (2-5 years) leading to a logical progression, and an increasing complexity and scope.

ACTIVITIES, START-UP PHASE (FIRST 2 YEARS)

- **Develop ArORA foundational documents**, including Terms of Reference, financial plan, long-term sustainability roadmap, key performance indicators, and risk management plan.
- **Maintain annual meetings, online and at ASSW**, and explore opportunities at other national and international Arctic events to grow the network of ArORA members, partners and collaborators.
- **Partner with existing organizations and initiatives to support Indigenous- and community-led observing networks for enhanced exchange of information and knowledge.** Activities will address practical elements of community-led and community-based observing tools, approaches, relevant observations, data quality control, Indigenous data sovereignty, and the data and information needs of weather and modelling communities. This will enable wider and more inclusive involvement in ArORA.
- **Explore options and identify needs and gaps related to ‘matchmaking’ capabilities that link users and providers of ocean information.** This aims to map existing practices, understand communication barriers between observing communities, and identify approaches that facilitate the sharing of data, knowledge, information, and best practices. Strengthening such connections can support the shaping of observing activities early in their planning stages and help to gain additional value from ongoing efforts. This work is also expected to contribute to the growth and maturation of ArORA itself. Based on the findings from this exploration, potential approaches for ‘matchmaking’, ranging from targeted meetings or workshops to digital interfaces such as lightweight message boards, mailing lists, or more interactive platforms will be considered for subsequent development and implementation.
- **Support implementation planning for the International Polar Year, IPY-5 (2032-2033).** This is envisioned as one of ArORA’s major tasks in the coming years, as it aims to be an active facilitator in aligning the marine components of IPY-5 actions on an international scale. This will require close interaction with national planning committees and the respective research teams in the years prior to the IPY5.
- **Initiate and maintain a crowd-sourced inventory of Arctic Ocean observing efforts.** This would leverage existing efforts and seek ongoing, active engagement of the ArORA community to create and continuously update an inventory of observing system elements.

ACTIVITIES, MEDIUM-TERM (2-5 YEARS)

Building on the initial tasks during the start-up phase, ArORA's next phase will begin to address issues of international coordination and extension of global observing systems.

- **Develop concepts for a sustained core Arctic Ocean observing system** in close collaboration with the SAON ROADS process and the GOOS global basic observing network design activities; identify practical steps for coordination, implementation, and funding of the sustained networks.
- **Support rightsholder and stakeholder engagement** to identify needs from local to global scales and while adhering to Inuit Circumpolar Protocols for Equitable and Ethical Engagement (ICC, 2022).
- **Support training, workshops, and other opportunities** for early career ocean professionals, including Indigenous early career researchers (ECR) and Knowledge holders.
- **Advance the inclusion of Arctic-specific procedures for ocean observing** in federated networks of ocean best practices and methodologies.
- **Maintain and promote best practices and methodologies for Arctic Ocean observing**, including Arctic-specific procedures. Establish an expert coordination team to regularly review Arctic Ocean observing plans, identify opportunities for improved coordination, and issue recommendations for interoperable field operations and infrastructure-sharing mechanisms, including collaboration approaches with local Indigenous rightsholders.
- **Expand support for implementation planning for the International Polar Year, IPY-5 (2032-2033)**. Build on support from the start-up phase of ArORA with expanded engagement and coordinated contribution through the active and legacy phases of IPY-5.

IV - STRUCTURE AND GOVERNANCE

Establishing a governance framework for a pan-Arctic Ocean observing alliance requires a multi-faceted approach that balances the diverse interests of Arctic nations, Indigenous communities, research institutions, and international bodies while being grounded in international collaboration, shared principles and best practices, and a commitment to equity.

THE FOUNDATION: SHARED PRINCIPLES

ArORA's governance structure would be built upon a foundation of shared, agreed-upon principles including:

- **Societal Benefit:** ArORA prioritizes observational activity that provides societal benefits in the Arctic and beyond.
- **Inclusivity:** The ArORA people network will be open to new membership and diverse perspectives and will be designed to grow over time.
- **Co-Production of Knowledge:** A formal commitment to respect multiple ways of knowing and to weave Indigenous Knowledge, community-based observations and scientific research together to achieve a holistic understanding of ocean change. This moves beyond consultation to true partnership in the design and implementation of ocean observing activities, and the interpretation of information and data flowing from those activities.

- **Open Data Policy:** A commitment to the free and open exchange of data and information, consistent with international frameworks such as the World Meteorological Organization (WMO) and Intergovernmental Oceanographic Commission (IOC) and guided by the Inuit Circumpolar Council Protocols (ICC, 2022). The Open Data Policy would apply to data that is not culturally sensitive and would work in harmony with a commitment to Indigenous data sovereignty. This ensures that all parties benefit equitably from the alliance.
- **Data stewardship:** Align with the FAIR (Findable, Accessible, Interoperable, Reusable), CARE (Collective Benefit, Authority to Control, Responsibility, Ethics) and TRUST (Transparency, Responsibility, User Focus, Sustainability, Technology) principles and work in close collaboration with the Arctic Data Committee to ensure harmonization and best practice among data centers that house Arctic data.
- **Interoperability:** The adoption of common standards for instrumentation, data formats, and metadata to ensure that data from different nations and platforms can be easily integrated and used together.
- **Sustained operation:** ArORA focuses on sustained marine observation, acknowledging that such activities will be supported by a mix of limited duration (research) and long-term (operational) funding. ArORA will seek mechanisms to secure sustained, predictable funding, ensuring the long-term viability of the observing network. The highly seasonal and logistical challenges of the Arctic necessitate a commitment that extends beyond short-term research grants.
- **Scalability:** The opportunity to scale the organization as needs and activities change over time.

PHASED IMPLEMENTATION APPROACH

INITIAL PHASE

For the initial, establishing phase, ArORA will seek a hosting institution that has in place the necessary financial, legal, and physical infrastructure to support it. A single host will give the alliance an advantage of operational efficiency, a simplified legal framework to navigate, focused resources, and infrastructure. This does not exclude financial support from additional sources for the initiative as a whole or for a secretariat. During this period (2-4 years), the necessary governance bodies for ArORA will be established. In addition, ArORA will address the short-term (start-up) tasks as described and develop a strategy for addressing the medium- and long-term tasks. The primary purpose of this initial phase is to transition ArORA from a conceptual phase to a fully mature organization, capable of implementing a response to its mandate and demonstrating its value to the wider international community.

MATURE ARORA

After the initial phase is completed, a new phase of diversification and globalization will ensue. This may lift ArORA from its single host dependency and will allow it to scale to its appropriate size. Doing so will require ArORA to have in place the appropriate hosting arrangement to allow other agencies to transfer resources to it to sustainably support its ongoing operations.

PROPOSED STRUCTURE

ArORA is fundamentally a community of stakeholders and Indigenous rightsholders. It includes observational researchers, data users and managers, government entities, practitioners, policy makers, resource providers, with the common interest in maintaining a marine-focused Arctic observing system that meets basic needs and provides a forum for coordination and collaboration around Arctic marine observing. This includes emerging observing needs, data management and sharing, technology development and deployment, fostering the next generation of ocean observers and a variety of related needs. Governance (Fig.4) is anchored in an ArORA Council composed of representatives from participating non-governmental stakeholder and rightsholders, and agency representatives from the Arctic nations and Indigenous organizations as well as from non-Arctic nations with strong involvement in Arctic observing.

Executive functions will be vested in a Steering Group (SG) composed of individuals elected by and from the ArORA Council. A Secretariat (as a single or distributed office), that can manage workflows across different time zones, will provide support for all ArORA functions. An ArORA Forum will provide a low-commitment path for casual engagement, incorporating the ArORA Council but open to all. Lastly, working groups and task teams will be established as needed at the decision of the Steering Group and presented to the Council to focus on specific issues and problems, disbanding after their charge is complete.

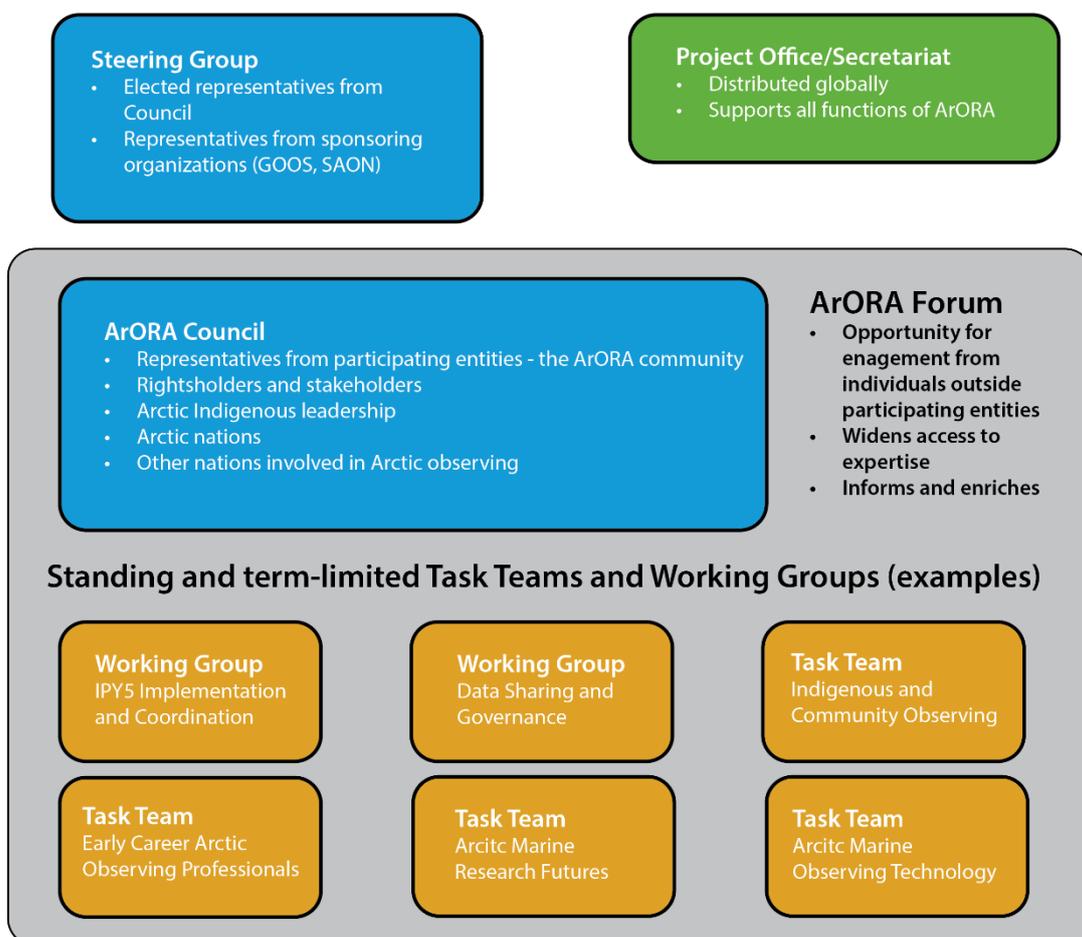


Figure 4. Suggested governance structure for the Arctic Ocean Regional Alliance (ArORA) tiered to address international, national, and local needs.

HIGH-LEVEL INTERNATIONAL GOVERNANCE

THE ArORA COUNCIL

The ArORA Council will be composed of representatives from the community of stakeholders and rightsholders, including Indigenous organizations, science, private sector, coastal communities and coordination bodies that are active in the Arctic observing community along with agency representatives from the Arctic states, Indigenous governments, and other nations that have an interest in or make significant contribution to Arctic marine observations. The ArORA Council will be the forum for representatives of these groups to advocate for their interests, deliberate, seek solutions and influence the direction of the ArORA.

THE STEERING GROUP

The Steering Group will be co-Chaired by leaders elected from the ArORA Council. It is envisioned that representatives will rotate at regular intervals in all ArORA bodies, with the specific procedures to be detailed in the Terms of Reference during ArORA's initial phase. The Steering Group will be responsible for:

- **Strategic Direction:** Working to align high-level priorities and goals of rightsholders and stakeholders for the basic observing system.
- **Network Characterization, Design, and Evaluation:** In consultation with the Council designing an integrated network of *in-situ* (e.g., buoys, moorings, research vessels) and remote (e.g., satellite) observing platforms. Employ available benefit assessment frameworks to evaluate the health and performance of the system and its connection to delivering societal benefits.
- **Policy and Finance:** Securing informal national commitments and developing policy on data sharing and intellectual property.
- **Liaison:** Serving as the primary interface with GOOS and SAON, as well as other international bodies, such as the Arctic Council's Working Groups (e.g., AMAP, PAME), the WMO, and the IOC.
- **Purpose-driven Working bodies:** Establishing, reviewing and approving short-term and long-term task teams and working groups as necessary to pursue specific, strategically important topics and draft white papers, plans, and strategies for the ArORA (e.g. Data Sharing/Data Governance, International Polar Year, long-term research priorities, technology development, public-private partnerships to support Arctic observing).

DECISION MAKING

Decisions in the ArORA will primarily be made at the level of the Steering Group. The Council will foremostly serve as a consultative body but with voting responsibilities for the Steering Group. The Executive Secretary will have decision-making authority for the daily operations of the secretariat in consultation with the Steering Group and based upon the ArORA work plan. Working groups and other teams will have the mandate to make decisions based on the specific task for which they were stood up. They will make recommendations to the Steering Group that will present results to the Council once work is complete. The specifics of decision-making will be codified in Terms of Reference to be developed in the initial phase of the ArORA.

TECHNICAL AND SCIENTIFIC COORDINATION

Council membership would be open to experts from diverse communities including science, Indigenous, and local knowledge holders, coastal communities, operational agencies, private sector, policy and decision-makers, funding entities and coordination bodies. The Council will form working groups focused on specific tasks and needs.

Council members will apply their expertise and organizational perspective to:

- Identify and harmonize existing needs for the observing system. Track emerging requirements, coordinate responses, and monitor technology developments to address them.
- Share, review, identify, practices and refine them to ArORA common best practices, with recommended common protocols for data collection and quality control.
- Advocate for a distributed data system that ensures discoverable and accessible data at no cost to all users while honoring issues of data sovereignty.
- Communicate ArORA recommendations back to their communities and organizations and national authorities.

The actual implementation of observing systems rests with individual nations and Indigenous organizations and governments that have authority and responsibility within their borders and territorial waters.

SECRETARIAT

Coordination of the ArORA will require a well-integrated and organized secretariat with appropriate, sustained, dedicated resources. A scalable, distributed secretariat would be valuable to ensure that the global community behind ArORA is represented and to take advantage of the interest in supporting part- or full-time employees for the secretariat.

A central office should be designed to align and integrate ArORA's activities within both the GOOS and SAON frameworks, develop and track the budget, provide regular internal and external communications, and organize and convene meetings virtually and in person. A participating institution or organization could act as this central coordination hub in collaboration with a constellation of contributing staff around the globe. Part-time staff could be drawn from key Arctic observing entities or coordination bodies (e.g. EuroGOOS, Alaska Ocean Observing System, Canadian Integrated Ocean Observing System, Arctic Hub) to create a truly distributed, pan-Arctic ArORA secretariat.

FUNDING

A successful ArORA will require sustained financial and political support. ArORA will seek baseline funding for a secretariat/project office, as well as resources for specific activities through partnerships and collaborations on proposals. Based on its objectives and workplan, and the functioning of similar coordination structures, we estimate that ArORA, in the long-term, will require two full-time staff, including an Executive Secretary, to coordinate ArORA's planning and implementation with the Sponsors, the Steering Group, the Council, working groups and the wider forum. In addition to this staff, part-time personnel working through the distributed secretariat will be needed to lead specific time-bound tasks/working groups, and to provide pan-Arctic representation during the

implementation of the alliance. Resources should also be allocated to support secretariat functioning and travel, participant travel and support for Indigenous participation in the work of ArORA.

An appropriate host institution or organization will be sought for the secretariat. Staffing may be provided through a combination of support from the host institution as well as financial contributions or secondments from members of the alliance. The new European Union project Beyond Arctic PASSION will in the next coming years provide workshop support to assist with initiating the ArORA.

ARORA TASK TEAM

ArORA TASK TEAM STEERING COMMITTEE

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