

Advancing an Arctic Regional Component of the Global Ocean Observing System under SAON,
the GOOS Regional Alliance and the UN Decade for Ocean Science

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The urgent need to improve Arctic observational networks in support of environmental prediction (Smith et. al), climate change and ecosystem services (Lee et. al), and biodiversity (Canonico et. al) was underscored by recent whitepapers submitted to the Ocean Obs 19 Conference (<http://www.oceanobs19.net/>), collectively representing more than 100 authors. Each paper included specific recommendations for immediate observational improvements based on available technologies and recommendations to ready the future observing system, including recommendations for planning, optimization and system assessment. At the conference itself, an Arctic community meeting (<https://tinyurl.com/ArcticObs19>) was convened to explore higher order recommendations stemming from all Arctic topics and to solicit greater input from conference attendees. Two synthesis themes emerged from these collective efforts: the need for a clear organizational leadership to consolidate recommendations into requirements and implementation plans for funding agencies; and the need for a set of priorities for making strategic investments in observing systems defined by requirements linked to benefits and value for stakeholders.

Organizational leadership under the joint auspices of the Sustaining Arctic Observing Networks (SAON) and the Global Ocean Observing System (GOOS) has been proposed to maximize the participation of the research and operational communities, tied to global efforts, under the organizational concept: Arctic Regional Component of GOOS (ARC-GOOS). Development of ARC-GOOS will leverage significant progress in the region consistent with the GOOS 2030 Strategy and vision for a fully-integrated system delivering ocean information in the areas of operational services, climate, and ocean health. This includes the experience of networks such as the Alaska Ocean Observing System (part of the US Integrated Ocean Observing System, a GOOS Regional Alliance), and the Arctic Marine Biodiversity Observing Network (AMBON), which partners with GOOS, the Group on Earth Observations, and other Arctic and global networks to advance collection of biological observations at scales appropriate to assess the status of marine life, integrate biology with physical and biogeochemical observations, and inform understanding of how climate and environmental changes impact critical living resources. In this capacity, AMBON is directly contributing to US IOOS, and is thus poised to support ARC-GOOS. Essential Ocean Variables (EOVs) are a guiding principle for this activity and have been

identified as those variables important for detecting and predicting changes in coastal and ocean areas.

The main recommendation from the OceanObs19 Arctic community meeting was that by OceanObs'29, the Arctic community should be able to prominently demonstrate it has a fully developed, implemented and sustained ocean observing system that meets – at a minimum – earth system prediction needs, but also meets other critical societal benefits. Though ambitious for a 10 year timeframe, progress towards this vision might take the form of one or more regional systems that support observations across timescales and disciplines. An additional recommendation was that Arctic observing and planning should draw extensively at the outset on the principles of co-production, co-design and co-management of observing systems with inclusion of Indigenous and local communities, who are being most impacted by Arctic change. International efforts such as the Year of Polar Prediction and the MOSAiC field campaign may provide critical analytical insights into the most impactful observational strategies and a path forward for observing system design.

These recommendations are consistent with the overall Ocean Obs 19 conference recommendations, which among other things encourage the community to focus an interdisciplinary, multi-sector ocean observing system on 'addressing critical human needs, scientific understanding of the ocean and the linkages to the climate system, real time ocean information services, and promotion of policies that sustain a healthy, biologically diverse, and resilient ocean ecosystem.' The recently announced UN Decade of Ocean Science for Sustainable Development presents a valuable opportunity to build upon the momentum of these community efforts and to move ARC-GOOS into active planning, with strong international engagement. The IOC has approved two meetings under the heading *Arctic Ocean Decade Workshops – preparing for the UN Decade of Ocean Science*. The first, *Arctic Ocean Decade Policy-Business-Science Dialogue*, will convene in Tromsø as part of the Arctic Frontiers meeting. The second will take place in Copenhagen, Denmark April 29-May 2. We propose that a discussion on both ARC-GOOS, the UN Decade, and their shared objectives also be included in the Arctic Observing Summit as a side meeting.

Through strengthened coordination and leadership, the Arctic observing community is well-positioned to serve as an example of a fully-integrated ocean observing system, to advance regional efforts that meet the needs of Indigenous and local communities and other stakeholders, and to support global efforts and the priority of the UN Decade to reverse the cycle of decline in ocean health. What is currently essential is that SAON, academic partners, Indigenous communities, regional stakeholders and operational weather services, in collaboration with the GOOS Regional Alliance, use both the UN Decade process, SAON's ROADS process, as well as convening opportunities like the Arctic Observing Summit to formalize these concepts under a broadly-supported structure for planning.

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