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Summary Report of State of Readiness on Arctic Observations

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Executive Summary

In 2018, the Sustaining Arctic Observing Networks (SAON) initiative approved both a Strategic Plan and Implementation Plan that provided direction on addressing the Arctic's current and future observing needs. In moving forward from these strategic planning documents and to inform the SAON Committee on Observations and Networks (CON) a survey amongst the National Board members was conducted. The survey was a self-assessment by each country in terms of their capacity and capabilities to reach the newly enunciated SAON objectives. The self-assessment showed that most countries considered themselves to be in a high or intermediate state of readiness relating to Goal 1 *Creating a Roadmap to Well-integrated Arctic Observing System*; however, there was a larger diversity in the responses relating to state of readiness relating to Goal 2 *Free and Ethically Open Access to Arctic Observational Data* and Goal 3 *Ensuring Sustainability of Arctic Observing*. In addition to the self-assessment survey, subsequent detailed questions were asked of the countries relating to objectives within Goal 1 to better understand the responses. This White Paper presents the highlights from the self-assessment of national capacity and capabilities as well as from the more detailed survey questions. Outcomes reveal readiness at national levels towards Goal 1, a Roadmap toward integrating observations, with a range of recommendations towards reaching this goal and assisting with international coordination. Goals 2 and 3 of data accessibility and future funding remain areas requiring support across many countries.

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Background:

The Sustaining Arctic Observing Networks (SAON) is a joint initiative of the Arctic Council and the International Arctic Science Committee (IASC) that aims to strengthen multinational engagement in pan-Arctic observing. The SAON process was established in 2011 at the Seventh Ministerial Meeting of the Arctic Council (AC) via the Nuuk Declaration. This declaration recognizes the “importance of the Sustaining Arctic Observing Networks process as a major legacy of the International Polar Year for enhancing scientific observations and data-sharing.” The declaration also defines the SAON governance structure and Terms of Reference, which were formally approved in 2012 (1).

In 2014, the SAON Board finalized its first implementation plan, which established two committees: The Arctic Data Committee (ADC) and the Committee on Observations and Networks (CON). The ADC aims to promote and facilitate international collaboration to establish free, ethically open, sustained, and timely access to Arctic data through easily accessible and interoperable systems. The CON aims to promote and facilitate international collaboration towards a pan-Arctic Observing System, which is defined as a sustained, integrated and multi-disciplinary system for observing this region of rapid change.

Over the period from 2014-2018, the two SAON Committees launched into their respective work activities with engagement and participation from over ten member states. In 2018, the SAON Strategy document (2) was developed to provide a 10-year strategy to address current and future Arctic observing needs. The document, approved by the SAON Board in January 2018, sets priorities for how SAON will fulfil its mission. It describes SAON’s vision, mission, guiding principle and goals, and outlines the manner in which the goals will be achieved.

In support of the new SAON Strategy, a complementary document entitled, SAON Implementation Plan (3), was also developed and approved in 2018. The Implementation Plan provides detailed information about the objectives of SAON, as well as descriptions of timelines, cooperation with external organisation and resource/funding requirements. It is a living document that will be regularly updated. The Second Arctic Science Ministerial meeting, October 2018 (4), identified SAON as the organization to facilitate collaboration among nations and organizations on moving “(...) to the deployment phase of an integrated Arctic observing system (...)”. The survey results and findings presented in this White Paper will help assess progress made towards achieving this goal.

Approach: Survey of National Board Members’ Capacity and Capability

In moving forward from these strategic planning documents, SAON conducted a survey amongst the National Board members. The survey was a self-assessment by each country in terms of their capacity and capabilities to reach the newly enunciated SAON objectives. In

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In addition to the overall state-of-readiness survey, more detailed questions were posed specifically relating to Goal 1: *Creating a Roadmap to Well-integrated Arctic Observing System*. These questions were directed at Objective 1.1: *Conduct an inventory of national observational capacities* and Objective 1.3: *Provide recommendations for a roadmap for future Arctic observational capacities*. In total, thirteen SAON National Board members answered the survey. The thirteen responses were provided from Denmark, Finland, France, Germany, Iceland, Italy, Japan, Korea, Norway, Poland, Spain, Sweden and the United States of America.

The results of the thirteen SAON National Board members' self-assessment are presented in below in the table. National Board members have filled in the matrix where they indicate their national capacity and capability to contribute to SAON Goals and Objectives.

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Table: Results from SAON National Board Members Self-Assessment re: Capacity and Capability for SAON Implementation Plan, July 2018

SAON Strategic Objective	Yes - High	Inter-mediate	No - Low
	Frequency (percent)		
Goal 1: Creating a Roadmap to Well-integrated Arctic Observing System			
Objective 1.1: Conduct an inventory of national observational capacities Each country will establish a national SAON organisation/office/contact point to gather information and report on capacity and monitoring efforts. SAON will facilitate the establishment of national organisations/offices/contact points by providing suggestions for ToR and relevant membership, and by providing examples on different organizational models	7 (57)	6 (46)	0 (0)
Objective 1.3: Provide recommendations for a roadmap for future Arctic observational capacities Advocate and create awareness about the recommendations work on the national level (national observing entities, infrastructures, national funding bodies) and provide information back to the international SAON level.	1 (8)	12 (92)	0 (0)
Objective 1.4: Create opportunities to develop and implement observations in support of Arctic Societal Benefit Areas (SBAs) Provide observation source information. Participate in technology and funding fora events.	0 (0)	7 (57)	6 (46)

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Objective 1.5: Develop a long-term repository for relevant project deliverables – establishment of Arctic GEOSS	1 (8)	9 (69)	2 (15)
Goal 2: Free and Ethically Open Access to Arctic Observational Data			
Objective 2.1: Create a road map outlining the steps towards achieving a system that will facilitate access to Arctic observational data	10 (77)	2 (15)	1 (8)
Objective 2.2: Advance a system to facilitate access to Arctic observational data	6 (46)	6 (46)	1 (8)
Objective 2.3: Establish a persistent consortium of organizations to oversee the development of a sustainable, world-wide system for access to all Arctic data	2 (15)	8 (62)	3 (23)
Goal 3: Ensuring Sustainability of Arctic Observing			
Objective 3.1: Develop a strategy for long-term financial commitment in Arctic observations National/regional nodes must be established within 2018. Should nominate experts and contribute to the implementation	2 (15)	8 (62)	3 (23)
Objective 3.2: Apply the strategy developed in 3.1 to advocate to funding agencies and states to ensure sustainability of Arctic observing The SAON member nations (Board members) will name the individual responsible to provide essential information and provide required resources. Review plans on national support to implement SAON objectives.	0 (0)	7 (54)	6 (46)
Objective 3.3: Secure funding for international SAON secretariat and operational costs The SAON member nations (Board members) will name the individual responsible to provide essential information and provide required resources. Board members should facilitate contact with their appropriate national funding agencies.	5 (38)	6 (46)	2 (15)

Note: The scores behind this table is found in *Role_of_national_SAON_organisations* (5), where individual responses can be found. In some cases, countries have supplied two responses. In the cases where the responses deviate, a mean value has been calculated as this: “Yes/Green” and “Intermediate/Yellow” is reported as “Yes”; “Intermediate/Yellow” and “No/Red” is reported as “Intermediate”.

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Analysis

SAON Goal 1: Creating a Roadmap to Well-integrated Arctic Observing System

Objective 1.1: Conduct an inventory of national observational capacities. Within this objective, each country is tasked with establishing a national SAON organisation, office, or contact point to gather information and report on capacity and monitoring efforts. The objective states that SAON will facilitate the establishment of these national organisations, offices, or contact points by providing suggestions for Terms of Reference and relevant membership, and by providing examples on different organizational models.

In the thirteen responses received from National Board Members, they reported to have either high or intermediate capacity or capability to conduct such an Inventory. There were no responses at the low level of capacity and capability. This is very encouraging to see that nations have a good overview (inventory) of their observational capacities. This capacity is generally in line with the information that has been submitted and which is available in the SAON inventory online.

In regards to the state of readiness of a national inventory, one response noted that even if they do not yet have an inventory, they did have quite a good overview on the national observational capacities; others noted that while they have gathered pieces of information, an up-to-date inventory of the observation and monitoring capacities in the Arctic is still to be undertaken; and others noted that an inventory had been conducted over eight years ago and that it needs to be updated following the framework of the SAON Strategy and Implementation Plan. Another response noted that since they do not have many institutions related to Arctic observing, that it is relatively easy to collect information from the few institutions.

In the detailed survey, National Board Members were asked “what specifically could be coordinated” in Objective 1.1? In the responses, several countries asked for guidelines to be developed on the selection and organization of relevant information to be collected in national inventories as this would help harmonize the work according to international standards.

In addition, there was a need recognized for greater coordination in having a common identification of variables that are always measured, e.g. Essential Arctic Variables (EAVs).

Another response noted that within Objective 1.1, there was a need to provide a platform for an overview of ongoing national and international activities.

Objective 1.3: Provide recommendations for a roadmap for future Arctic observational capacities. This objective includes being able to advocate and create awareness about the

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recommendations work on the national level (national observing entities, infrastructures, national funding bodies) and provide information back to the international SAON level.

The thirteen survey responses were almost unanimous to be in the “intermediate capacity/capability” state of readiness to deliver on this Objective. There were no responses at the low level of capacity/capability. This is very encouraging that many members are near-ready to provide input for a roadmap on observational capacities.

In the detailed survey, National Board Members were again asked “what specifically could be coordinated” in this Objective? Specific comments included in the survey responses provided insight into why National Board Members consider themselves to be in this intermediate state of capacity and capability.

There were several responses relating to the need for better coordination and linkages within international Arctic networks. One response noted that coordinated access to internationally available polar infrastructures (e.g. ice-going research vessels) would be a major step forward for all scientific communities. Another response noted that operation of national research bases, stations and research vessels could benefit from better coordination within international networks including large infrastructure projects and programs. The SIOS (Svalbard Integrated Arctic Earth Observing System) network was cited as a good example. Such initiatives were reported as being instrumental for sustaining and strengthening the activities of non-Arctic countries that have a strong interest in and a long tradition of participating in Arctic observations but also struggle with serious limitations due to logistic challenges, access to infrastructure, funding issues and sometimes lower awareness of the Arctic research/observations among the national decision makers and funding agencies. Given that SAON has a mandate to facilitate the international collaboration in Arctic observing and, based on the national inventories of networks and infrastructures, National Board Members reported that it could play a role in initiating/supporting new initiatives.

National Board Members also reported in the survey that it is important that SAON promote coordination and dialogue among the various initiatives ongoing at European (e.g. EU-PolarNet) and international levels, including a stronger connection with the new Arctic Global Earth Observation System of Systems (GEOSS) proposal.

Several countries reported that they either already have or are in the process of developing Arctic and/or Polar strategies which likely positions them well to deliver on this Objective 1.3 and results in the intermediate state of readiness. It was noted that these national strategies were frequently broad in scope, including all research in the Arctic and not only research related to observations. Others noted that while national strategies were in place, these strategies contained high level recommendations and that a more detailed roadmap was still

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needed. In general, these national strategies could serve as good starting points to identify national priorities, needs and recommendations for a roadmap for future Arctic observational capacities and also help SAON to formulate common recommendations for a roadmap aiming to improve observational capacities in the Arctic. These national strategies could contribute in a concrete manner to the implementation of this roadmap.

In the detailed survey, National Board Members were asked “What would be a useful working definition of this Roadmap? What should the Roadmap include from the standpoint of your national funding body?”

The thirteen respondents provided excellent insight on a wide range of aspects that would be incorporated into the development of a road map. Highlights of the responses regarding what the road map for future Arctic observational capacities could include are provided below:

- Advance international opportunities for Arctic observations
- Provide clearer perspectives and facilitation of access to both data and technicalities of the monitoring programs
- Address mechanisms for engagement and collaboration with Indigenous Knowledge and communities
- Incorporate observations that have the highest impact (what, where, how) in support of models and prediction services
- Approach the need for observations in thematic stages, preferably initiated/fuelled by specific needs articulated by relevant user groups (and maybe within specific Societal Benefit Areas - SBAs). For example, AMAP/CAFF are looking into the possibility of initiating an assessment process looking at climate change and ecosystems impacts. To assist this process, it will be relevant for SAON CON to conduct a more in-depth assessment and inventorying of any ongoing observation efforts, in addition to those already identified in our inventory that could feed into this assessment process.
- Create opportunities to develop and implement observations in support of Arctic Societal Benefit Areas.
- Clarify the respective role and function of SAON with respect to different coordination initiatives active at international level (for Europe at least EU-PolarNet and Arctic Cluster);
- Pathways to improve “Readiness” of the observing system, technology development.
- Consider the possible role of Research Infrastructures; how the inventory can be used capture proposals for new national needs for research infrastructure

Objective 1.4: Create opportunities to develop and implement observations in support of Arctic Societal Benefit Areas (SBAs). Under this Objective, National Board Members were to provide observation source information and participate in technology and funding fora events.

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The table shows that the thirteen national responses are split almost equally between an intermediate and low state of readiness. No additional questions were asked of the National Board Members to understand the nature of this self-assessment.

Objective 1.5: Develop a long-term repository for relevant project deliverables – establishment of Arctic GEOSS. The table shows that 69% of the thirteen national responses consider themselves to be in an intermediate state of readiness. Again, no additional questions have been asked of the National Board Members to understand the nature of these responses.

SAON Goal 2: Free and Ethically Open Access to Arctic Observational Data

Objective 2.1: Create a road map outlining the steps towards achieving a system that will facilitate access to Arctic observational data. Thirteen responses were again provided relating to the national state of readiness of capacity/capability for this objective. The majority of the self-assessments, 77%, considered themselves to be in a high state of readiness. The remaining respondents considered themselves to be in an intermediate state of readiness, with only one respondent reporting to be in a low state of readiness.

Not unexpected amongst the responses, was the recurring request for greater coordination on data interoperability, data transfer and search ability, and access to the observing systems. Another important feature was the need to facilitate easy access and searchability of databases.

Finally, another area reported for possible coordination was in regards to providing room to expand international contributions or at least align for interoperability and data harvesting.

Objective 2.2: Advance a system to facilitate access to Arctic observational data. The thirteen responses were split almost equally between a high and an intermediate state of readiness on this objective, with only one respondent reporting to be in a low state of readiness. No additional questions were asked of the National Board Members to understand the nature of this self-assessment.

Objective 2.3: Establish a persistent consortium of organizations to oversee the development of a sustainable, world-wide system for access to all Arctic data. The responses to the state of readiness for this objective were quite diverse, with four respondents reporting to be in a low state, two in a high state, and others in an intermediate state. Again, no additional questions were asked of the National Board Members to understand the nature of this self-assessment.

SAON Goal 3: Ensuring Sustainability of Arctic Observing

Under Goal 3, there were again thirteen responses relating to state of readiness of capacity/capability, but no specific questions were asked delving into these responses.

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Objective 3.1: Develop a strategy for long-term financial commitment in Arctic observations.

The responses to the state of readiness for this objective were lower than other objectives. Of the thirteen responses, two considered themselves to be in a high state of readiness with the remaining responses in either an intermediate or low state. No additional questions were asked of the National Board Members to understand the nature of this self-assessment.

Objective 3.2: Apply the strategy developed in 3.1 to advocate to funding agencies and states to ensure sustainability of Arctic observing

The responses to the state of readiness for this objective were considerably lower than other objectives. None of the respondents considered themselves to be in a high state of readiness. 46% of respondents reporting to be in a low state of readiness. Again, no additional questions were asked of the National Board Members to understand the nature of this self-assessment.

Objective 3.3: Secure funding for international SAON secretariat and operational costs. For this final objective, there was again a wide diversity in the responses, with almost half of the respondents reporting to be in an intermediate state of readiness while the remaining respondents were split between a high state and a low state. No additional questions were asked of the National Board Members to understand the nature of this self-assessment.

CONCLUSION:

The Second Arctic Science Ministerial meeting, October 2018 (5), identified SAON as the organization to integrate or facilitate collaboration among nations and organizations on Arctic observations. The Ministerial meeting further recommended that SAON be supported and resourced at levels sufficient to enable international coordination for building of an Arctic observing system. The survey results provided from the thirteen SAON National Board Members and presented in this White Paper provide a perspective on the readiness and needs pertaining to the SAON objectives for different SAON member countries.

The overall conclusion is that many countries have a high to intermediate level of readiness, especially when it comes to certain objectives within Goal 1 and 2. Meanwhile, many countries have a low to intermediate readiness, especially when it comes to Goal 3. This pattern may justify further studies.

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References:

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https://www.arcticobserving.org/images/pdf/Strategy_and_Implementation/SAON_Strategy_2018-2028_version_16MAY2018.pdf
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