Arctic Spatial Data Infrastructure

2017–2019
Biennial Report

ARCTIC SDI
Arctic Spatial Data Infrastructure

May 2019

Message from the Arctic SDI Board Chair

Understanding and responding to the impacts of climate change and human activities in the Arctic requires accessible and reliable data to facilitate monitoring, research, management and decision making. The Arctic Spatial Data Infrastructure (Arctic SDI) works with stakeholder organizations to make their key data accessible and interoperable. Arctic SDI facilitates data sharing at all levels: local, national, regional and global. Facilitated by the national mapping agencies of the Arctic States, Arctic SDI provides tools for data distributors and end users, ensuring that geospatial data is easy to access, validate and combine with other data.

It has been my pleasure to serve as the Chair of the Arctic SDI Board concurrently with the Finnish Chairmanship of the Arctic Council for the past 2 years. This report highlights the accomplishments of the Arctic SDI during the Finnish Chairmanship, acknowledging that they are a result of years of cooperation and efforts all of our eight countries.

In Finland's Chairmanship Program for the Arctic Council the overarching topic was "Exploring common solutions". Arctic SDI was part of the program, well in line with the topic with main aim in cooperation and commons solutions for data use and distribution in the Arctic, with emphasis on wider use of the Arctic SDI among the Arctic Council Working Groups. Cooperation with Arctic Council and its working groups is progressing, and data from the working groups is available in the Arctic SDI Geoportal.

Cooperation with the International Hydrographic Organization Regional Arctic Hydrographic Commission has intensified, focus being on an ecosystems-based approach in the Arctic through the integration of land and marine spatial data infrastructure initiatives.

As part of the outreach activities Arctic SDI has delivered information on SDI on several international events. Arctic SDI was given opportunity to organize a side event at United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) at UN Headquarters in New York in August 2018 to highlight the value and power of regional cooperation towards spatial data infrastructure development.

As gateway to Arctic SDI - to its topographic and thematic data - the Geoportal allows easy access and use of data: it can be used for browsing, visualizing, analyzing, and sharing spatial information. Dynamic interactive maps can be created for delivery via any website. Circumpolar place name search enables discovery of locations throughout the Arctic and all six Arctic map projections are supported by the Geoportal. Arctic SDI Geoportal is preparing a new tool for visualizing statistical information over the Arctic, such as the UN 2030 Agenda for Sustainable Development Indicators.

Please try and use the Arctic SDI geoportal for delivering your Arctic information to stakeholders in the region.The Geoportal is available in English, Finnish, French, Icelandic, Swedish and Russian and can be used easily by anyone, free of charge.

Sincerely,

Arvo Kokkonen

Director General, National Land Survey of Finland

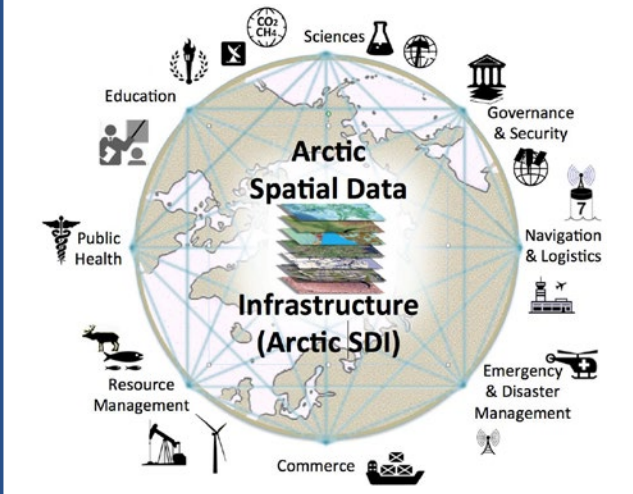
Contents

Why an Arctic SDI

The idea behind the Arctic SDI is to bring together data and information from distributed stakeholders - the most authoritative information we have - to aid in our understanding of what's happening in Arctic environment and allow smart decisions to be made as a result. Often data is difficult and costly to find, access, and combine due to a lack of standardized distribution of data and insufficient compliance to international standards.

A spatial data infrastructure (SDI) provides tools for data distributors to ensure geospatial data is easier for users to access, validate and combine with other data. Important datasets are produced and distributed by many stakeholders and most of it can be geographically referenced.

The Arctic SDI was established to address the need for readily available spatial data in the northern areas of the globe. The Arctic SDI works with stakeholder organizations to make their key data accessible and interoperable. With a focus on the Arctic Council and its working groups, the Arctic SDI facilitates data sharing at all levels: local, national, regional and global. It documents and applies information management best practices, based on open international standards, to build communities of practice to share data.



Graphic Source: OGC

Arctic SDI Mapping Agencies

- Natural Resources Canada, Canada Centre for Mapping and Earth Observation
- Agency for Data Supply and Efficiency, Denmark
- National Land Survey of Finland
- National Land Survey of Iceland
- Norwegian Mapping Authority
- Federal Service for State Registration, Cadastre and Mapping of the Russian Federation
- Swedish Mapping, Cadastral and Land Registration Authority
- U.S. Geological Survey

Arctic SDI initiative brings together geospatial experts in cooperation between the eight national mapping agencies of the Arctic countries (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States) in direct support of the priorities of the Arctic Council and other stakeholders.

Eight countries coming together around common standards and common goals is critical at this time, especially in the Arctic region where the climate change has rapid effects. The Arctic has a rich diversity of wildlife and is therefore is one of the most valuable and vulnerable regions on the planet.

Successes and Accomplishments in 2017-2019

In 2015 the Arctic SDI Board approved the Strategic Plan 2015-2020, which outlined strategic activities necessary for the Arctic SDI to deliver services to support Arctic stakeholders and facilitate the adoption of common information management best practices. Preparations for the update of the strategy were begun in 2019.

Strategic activities include iterative dialog with Arctic stakeholders to understand their unique needs for reference and thematic data and to gain insights into the constraints and challenges that impact technology and interoperability. Other strategic activities focus on improved data sharing through standards and information management best practices that contribute to the availability, accessibility and usability of data.

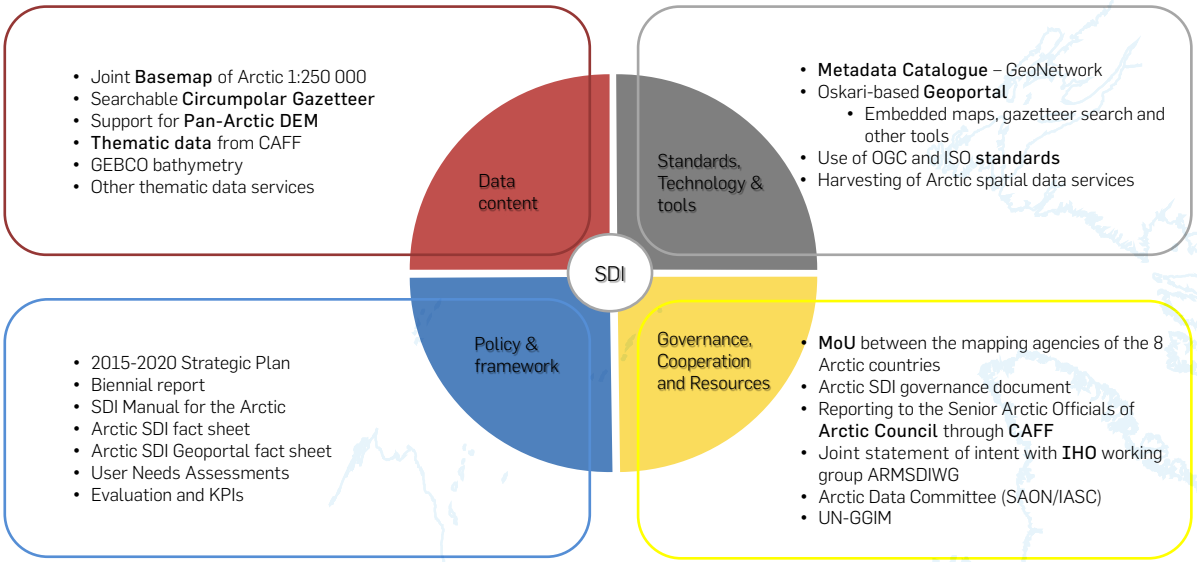
In May 2018 the Board decided to emphasize numerous ongoing Arctic SDI activities that further the priorities of value creation, communication and engagement with partners and stakeholders.

Two Arctic SDI **User Needs Assessments** were contracted to gather the needs of users and data providers. This resulted in two reports, an Environmental Scan on User Needs Assessment for Arctic SDI with a focus on Indigenous communities and Better Access to Geospatial Marine Data. **Guidelines for Data Providers** have been made available as part of the outreach effort to the Arctic Council and its Working Groups. **Operational Setup documentation** for website publishing and a **Service Level Statement for the Arctic SDI Central Services** as part of Operational Setup is in the works.

Outreach

A suite of communication materials are available, including Fact Sheets on Arctic SDI and Geoportal, videos "Introduction to the Arctic SDI" and "Geoportal" and an Arctic SDI Manual.

Status of the Arctic SDI



Arctic SDI led a Side Event at the United Nations Global Geospatial Information Management (UN-GGIM) in UN Headquarters in New York in August 2018 and was highlighted in the materials of the 2nd Arctic Science Ministerial meeting held in Berlin in October 2018.

The Arctic SDI has been expanding its **international cooperation** supporting multiple initiatives with the Conservation of Arctic Flora and Fauna's Arctic Biodiversity Data Service, Arctic Regional Hydrographic Commission Arctic Regional Marine SDI Working Group (ARMSDIWG), Open Geospatial Consortium (OGC), International Organization for Standardization (ISO), United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM).

Arctic SDI has engaged recently more deeply with the Arctic Data Committee (ADC) as part of the Sustaining Arctic Observing Networks (SAON) and International Arctic Science Committee (IASC) to facilitate data accessibility and influence information management best practices.

Arctic Council

In 2015 the Arctic SDI was invited to develop and facilitate a breakout session, titled Standardized Geospatial Data Management and Sharing, at the Joint Arctic Council Working Group Meeting held in Norway. Several key messages were highlighted in the Joint Meeting report to the Arctic Council SAOs. Cooperation and work with the Arctic Council has continued in support of identified key items identified including presentations to the Arctic Council Senior Arctic Officials Executive & Plenary in 2018 and 2019; and regular reports provided to the Arctic Council SAOs through the Conservation of Arctic Flora and Fauna Working Group (CAFF). Outreach and collaboration has resulted in integration of CAFF data, the dynamic delivery of embedded maps on their website, and joint presentations in conferences, such as the Arctic Biodiversity Congress in October 2018.

Arctic SDI is working with the Arctic Council Secretariat to identify the best ways to engage with these stakeholders and share guidelines for data providers. Arctic SDI is also working to update and generate data-driven, dynamic Arctic Council maps on the Arctic Council website.

Arctic Regional Marine Spatial Data Infrastructure (ARMSDIWG)

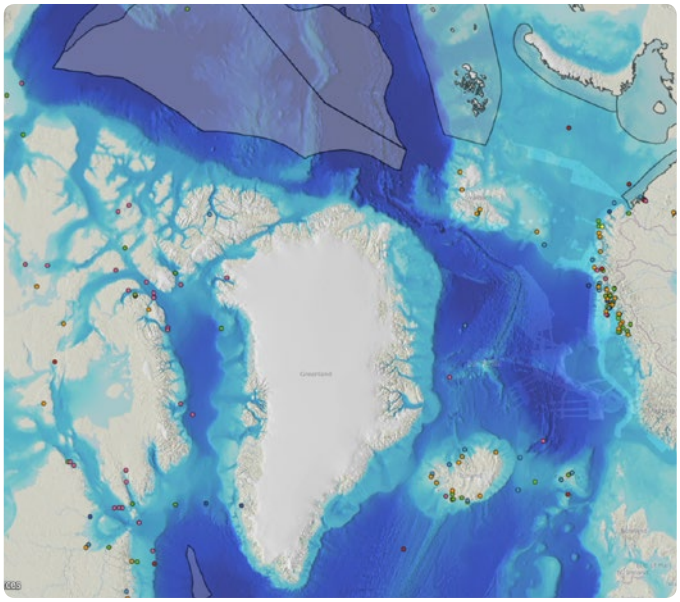
In September 2016, the Arctic Regional Hydrographic Commission (ARHC) formalized the ARMSDIWG. International representatives of the Arctic SDI and ARMSDIWG met in Copenhagen in April 2017, laying the foundation for a partnership that foster opportunities to bring authoritative Arctic land and water reference data together and help ensure no information silos are built.

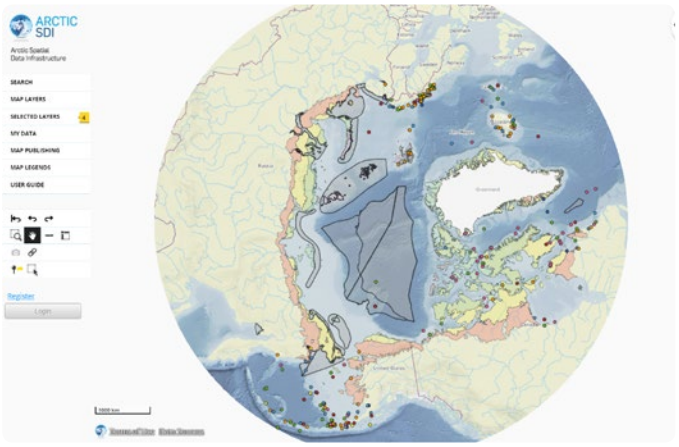
Follow up joint meetings were held in September 2018 and March 2019 to formalize the cooperation and identify

Joint meeting of Arctic SDI, Arctic Regional Marine SDI Working Group and Arctic Council Working Group CAFF in Iceland in April 2019

joint priorities. A Joint Statement of Intent documenting this partnership is under development. Desired outcomes ARMSDIWG will include support for marine stakeholders needs through the identification of key services and expansion of marine data to be included in the Geoportal.

Arctic SDI is supporting the Marine SDI Concept Development Study lead by the OGC and supported by the International Hydrografic Organization (IHO), ARMSDIWG and US National Geospatial-Intelligence Agency. This effort serves as an opportunity to build on work started with the OGC Arctic Spatial Data Pilot to gather information on stakeholder needs for data, use case information and build community understanding on the importance of interoperability through standards. A response to the Request for Information (RFI) was submitted by Arctic SDI detailing requirements on potential pilots and testbeds (search and rescue, coastal erosion) and datasets identified to address marine and land data sharing challenges.





Delivering Authoritative, Harmonized Data

Basemap

The Arctic SDI delivers a harmonized basemap that provides a unified topographic view over the entire Arctic with details such as elevation, rivers and lakes and other geographic features. It is produced using existing data delivered from the Arctic Mapping Agencies. It is made available via the Arctic SDI Geoportal to provide a common, authoritative base layer for data visualization.

A new version of the Arctic SDI Basemap was released in 2018. The new version is being delivered with a common cartographic specification detailed in its legend. The service has been processed to support the six polar projections specified for the Arctic SDI: Bering Sea, Alaska, Canada, Atlantic, Europe and Russia.

Arctic SDI aims to make more datasets available to allow mash-ups and development of applications that are limited only by the imagination of the stakeholders and scientists using the data.

Arctic SDI Geoportal

The Arctic SDI Geoportal is based on the open source platform Oskari developed and sustained by National Land Survey of Finland. It is built to support browsing, visualizing, analyzing and sharing distributed geographic information.

Geoportal users can combine map layers to visualize the phenomena of their choice. The Geoportal features for example a Time Series tool, which can be used to visualize how various phenomena, e.g. sea surface temperature change over time in the Arctic. Dynamic interactive maps, known as embedded maps, can be created for delivery via any website without any coding with just a few quick steps. Circumpolar place name search enables discovery of locations throughout the Arctic.

All six Arctic projections are supported and the Arctic SDI Geoportal is preparing a new tool for visualizing statistical information over the Arctic, such as the UN 2030 Agenda for sustainable development indicators.

An Arctic SDI email contact for user support has been established in the Geoportal and data to support Key Performance Indicators, such as the number of users and support for distributed embedded maps delivered via the Geoportal are being collected.

Arctic SDI Manual

The SDI Manual for the Arctic provides stakeholders with information and guidance on the planning, management, development and maintenance of the Arctic SDI. It provides good data management practices, identifies policy and guideline requirements and demonstrates the value and benefits an SDI provides to enhance efficient monitoring and decision making in the Arctic. The manual addresses the needs of three audiences: (1) high-level strategic decision makers, (2) Arctic data providers and distributors, and (3) the end users of Arctic data.

The SDI manual, and accompanying Glossary of Terms, are "living documents" that will be updated continually to reflect the evolution of SDI components and also the changing information requirements of the Arctic stakeholders.

Arctic Digital Elevation Model

ArcticDEM is a digital surface model (DSM) of the Arctic, created using optical stereo imagery, high-performance computing and open source photogrammetry software, created by University of Minnesota Polar Geospatial Center (PGC) and funded by the US National Science Foundation. It is a response to the need for high quality elevation data in remote locations, the availability of technology to process big data and the need for accurate measurement of topographic change.

The ArcticDEM encompasses all land area north of 60°N providing 2-meter resolution. In addition, coverage includes all territory of Greenland, the State of Alaska in entirety, and the Kamchatka Peninsula of the Russian Federation.

Glancing into the Future of Arctic SDI

As Iceland takes on the Chairmanship of the Arctic SDI in 2019 the Board will continue looking into the future with continuing focus on partnership with stakeholders, to increase the visibility of spatial data. Getting better access to data related to the Arctic Marine Environment as well as data to monitor climate changes in the Arctic will be priority items for upcoming years, building on Iceland's priority areas under the chairmanship of Arctic Council. With better access to spatial data in mind, Arctic SDI will strive to ensure that scientists, resource managers, decision makers and citizens can discover, access, combine and use trusted data to conduct research, make informed decisions and respond to issues and emergencies in a changing Arctic.

Website:

https://arctic-sdi.org/ https://geoportal.arctic-sdi.org/

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