



**ARCTIC
SDI** Arctic Spatial
Data Infrastructure

ARCTIC
SDI

Bering Sea

Petropavlovsk
Kamchatka

arctic-sdi.org
Bay of
Ochotsk



**ARCTIC
SDI** Arctic Spatial
Data Infrastructure



ARCTIC
SDI Arctic Spatial
Data Infrastructure

Arctic Spatial Data Infrastructure

Enabling Access to Arctic Location-Based Information

Arctic SDI Side Event Co-Chairs:

Arvo Kokkonen

Arctic SDI Board Chair & Director General, National Land Survey of Finland

Kevin T. Gallagher

Arctic SDI Board Member & Associate Director, U.S. Geological Survey



Arvo Kokkonen

Arctic SDI Board Chair
Director General,
National Land Survey of Finland

Agenda

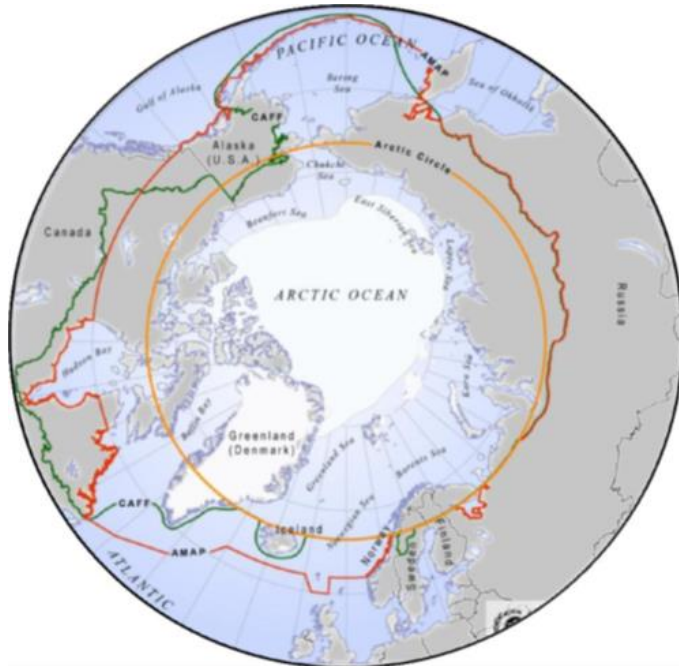
- **Introduction to Arctic SDI**
- **Why an Arctic SDI**
- **Arctic SDI Strategic Activities**
- **Stakeholder and Partner Engagement:
Delivering the Value of an SDI**
- **Arctic SDI governance structure,
infrastructure, services, tools**
- **Arctic SDI Geoportal Demo**

Vision: The Arctic Spatial Data Infrastructure will **facilitate access to geospatial information** in support of social, economic, environmental, monitoring, decision-making and other needs in the Arctic.

Mission: The Arctic Spatial Data Infrastructure mission is to **promote cooperation and development of a Spatial Data Infrastructure that enables discovery, visualization, access, integration and sharing** of Arctic geospatial data, while pursuing **best data management practices**

Users, Stakeholders and Data Providers

- Arctic Council Working Groups (CAFF, AMAP, EPPR, PAME)
- Academic institutions in the Arctic
- Government and public sector
- Business, media, citizens, NGOs,...



Arctic SDI is based on
voluntary commitments by
**the National Mapping
Agencies from 8 countries**
that border the Arctic Circle

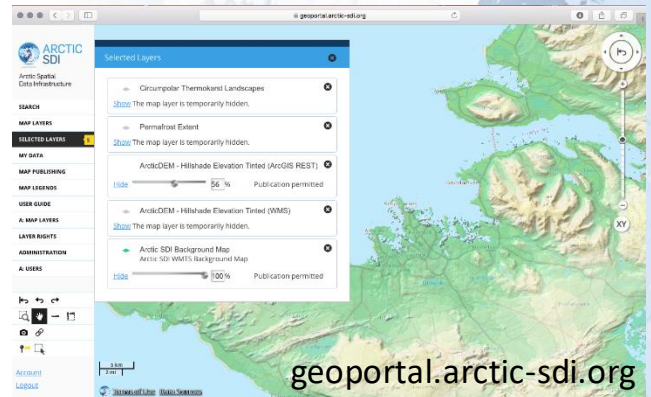
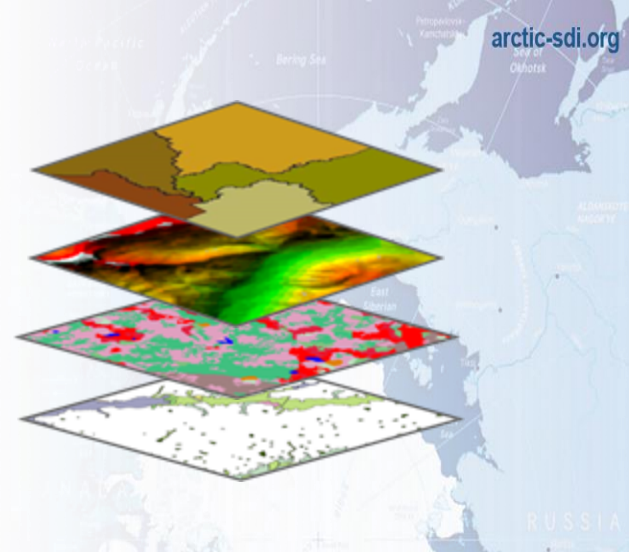
Canada, Denmark, Finland,
Iceland, Norway, Russia,
Sweden, USA

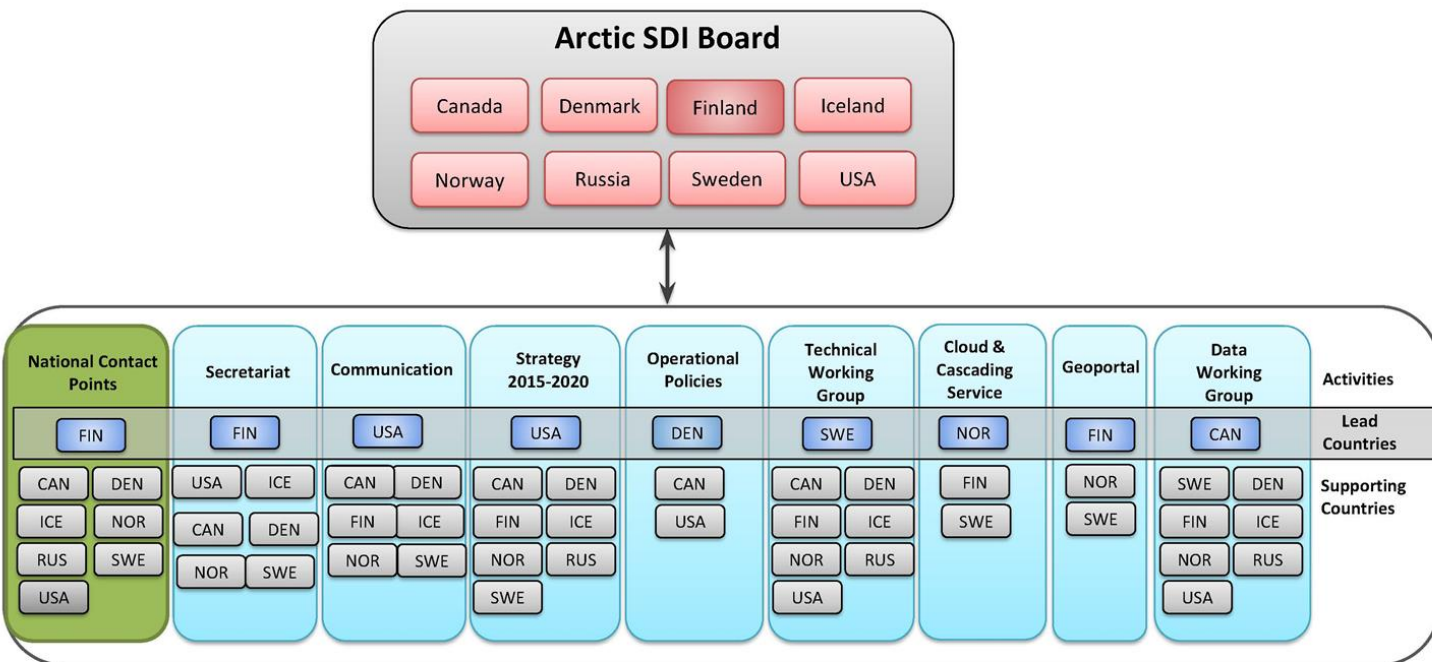
There is a signed Memorandum of Understanding
towards cooperative development of an Arctic SDI.

Arctic SDI Services

The Arctic SDI is an infrastructure that provides a web portal with easy access to:

- A geoportal for geospatial data viewing and discovery
- A searchable metadata catalogue
- Authoritative reference data as a
 - Web Map Service (WMS) 1:250.000
 - Searchable Circumpolar Gazetteer
- Thematic data and partnerships – Distributed Sources
(DEM, marine data, ice cover, ship routes, flora & fauna, etc.)





2018

Strategic Objectives from Arctic SDI Strategic Plan 2015 -2020

1. Address Needs of Arctic Council and Other Users
2. Provide Reference Datasets
3. Facilitate Access to Thematic Datasets
4. Data and Technical Interoperability
5. Spatial Operational Policies
6. Communications



Arctic SDI & ARMSDIWG Joint Workshop

Arctic SDI 2015-2020 Roadmap

2015

Strategic Plan
2015-2020

First Arctic Council
Working Group data
connected

GeoPortal

Reference Map

2016

Iterative dialog with all
Arctic Council Working
Groups in progress

- Needs
- Requirements
- Way forward

Most needs/requirements
prioritized,
Guidelines available

Harvesting
Metadata from
National SDIs

2018

Documented use of data
and services in websites
and applications

Data from all Arctic
Council Working
Groups connected

Specific reference
data needs and
requirements are
met

2020

Arctic SDI evaluation,
next Strategic Plan



Strategic Documents

Who and What is the Arctic SDI?

- [2015-2017 Biennial Report](#): Highlights from the US Chairmanship
- [Arctic SDI Fact Sheet 2016](#)

Governing Documents

- [Signed Memorandum of Understanding](#)
 - English, French, and Russian version
- [Arctic SDI Governance](#) v2.0

Arctic SDI Strategic Plan Documents

- [Strategic Plan 2015-2020](#)
- [Implementation Plan](#)
- [Roadmap](#)

Arctic Spatial Data Pilot

- [Open Geospatial Consortium Spatial Data Pilot](#) with data intensive scenario based videos and a Final Engineering Report

Pan-Arctic Digital Elevation Model

- [ArcticDEM – Arctic SDI Board Position Statement](#)
 - [Polar Geospatial Center ArcticDEM Documentation](#)

Arctic SDI Documentation

- [SDI Manual for the Arctic with Glossary of Terms](#)
 - Guidance and information management good practices on commonly accepted SDI operational policies and standards.
 - Audiences: strategic decision makers, data providers, distributors and end users of Arctic data
- [Arctic SDI Glossary of Terms](#)
 - A living glossary providing terms, acronyms, definitions and sources
- [Arctic SDI Evaluation](#)
 - [Arctic SDI Evaluation Report](#)
 - [Arctic SDI Evaluation Framework](#)
 - [Arctic SDI Evaluation and Benchmarking presentation](#)



Arctic SDI Historical Framework

- [Arctic-SDI-Framework-Document_V2 0](#)

Transforming our World: The UN 2030 Agenda for Sustainable Development

- Agenda 2030 Declaration highlights the need for “quality, accessible, timely and reliable disaggregated data”
- Arctic SDI and its Geoportal supports the Declaration through
 - Outreach with regional stakeholders to increase understanding and strengthen the “system of systems” approach to spatial data infrastructures,
 - Providing standards-based tools to find data, visualize data (determine fit for use and fit for purpose) and share data (e.g. embedded maps)

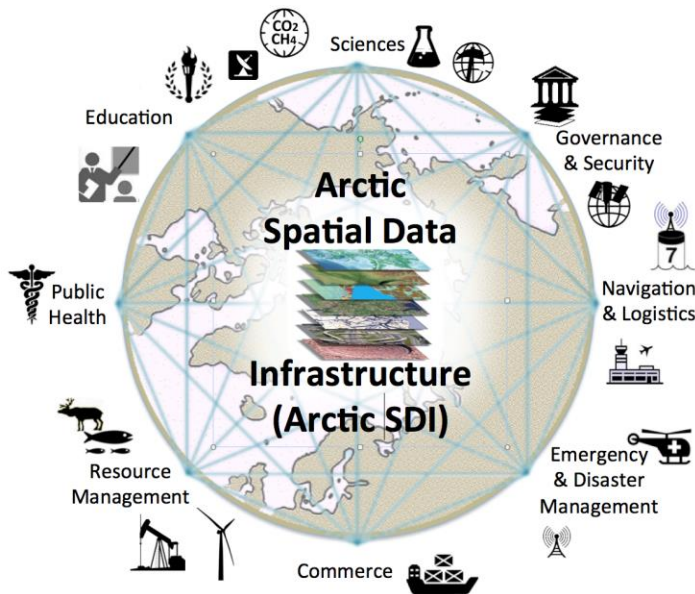


Kevin T. Gallagher

Arctic SDI Board
Associate Director,
U.S. Geological Survey

A Collaborative Model for Arctic SDI

Facilitate the “System of Systems” Approach to Data Sharing



- Working with stakeholder organizations to make their key data available, with a focus on the Arctic Council
- Understanding the needs and requirements of stakeholders
- Information Management best practices (lifecycle of geospatial data)
- Open standards and interoperability
- Helping data contributors and users understand how to participate and why it's important

An Intergovernmental forum **promoting cooperation, coordination and interaction among the Arctic States, Arctic indigenous communities and other Arctic inhabitants** on common Arctic issues...

- Endorsed Arctic SDI in 2009

Collaboration to develop common data sharing methodologies and best practices

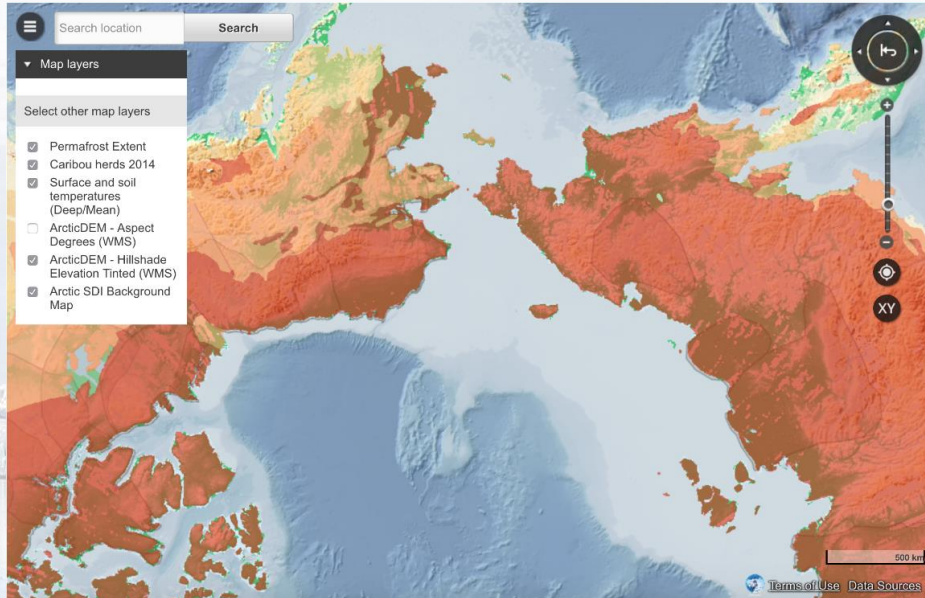
- Arctic **Contaminants** Action Program
- Arctic **Monitoring and Assessment** Programme
- Conservation of Arctic **Flora and Fauna**
- **Emergency** Prevention, Preparedness and Response
- Protection of the Arctic **Marine Environment**
- **Sustainable Development** Working Group



16

Partnering with Arctic Council

- **Enhance Data Management Best Practices** across Working Groups
- Regular dialog with Arctic Council
 - **Biannual Reporting through CAFF**
- **Incorporation of SDI standards into published data products**
- Using **Arctic SDI Geoportal** to enable customized embedded maps

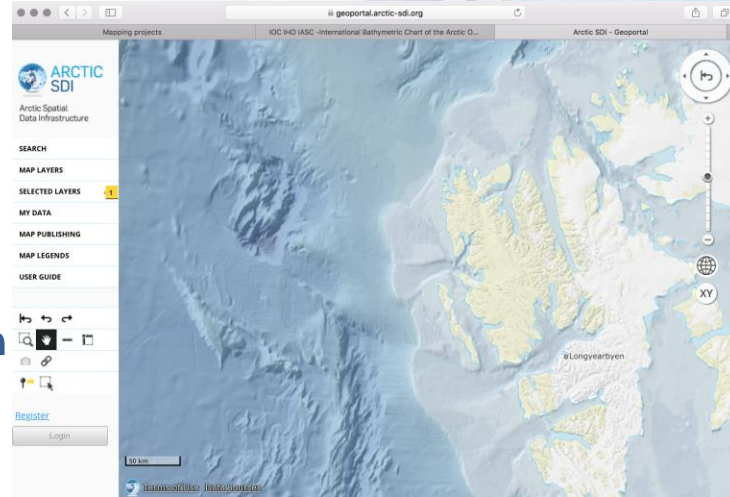


Arctic Regional Marine SDI Working Group

- Two Joint Meetings and a Workshop

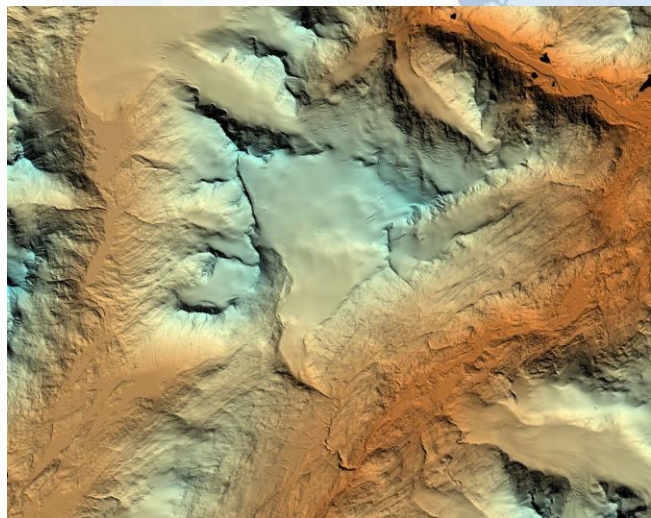
Develop a Joint Statement of Intent and Work to:

- Avoid duplication of effort
 - Efficiently use and expand on established communication channels and relationships with stakeholders
-
- Divide tasks with respect to established stakeholder “domains”
 - Build on existing infrastructure, such as
Geoportal and its services, communication tools such as the Website, centralized document storage environment, and Guidelines whenever possible.



Partnering on a Pan-Arctic DEM

- An initiative of the Arctic Council US Chairmanship to **produce a 2m resolution DEM** of the entire Arctic
- **Elevation Experts and NMA Representatives collaborated** to enrich the process towards delivery of a Pan-Arctic DEM
- **More than 95% of the world's Arctic regions are already covered** by the project
 - Next release September 2018
- **Available in a number of visualizations at the Arctic SDI Geoportal**



Governance Structure: *Information Management Best Practices*

SDI Manual for the Arctic: Provide Stakeholders with Guidelines & Best Practices

- Data Management and Sharing
- SDI Development & Growth
- Standardization

Arctic SDI Monitoring

- **Key Performance Indicators**
- **Arctic SDI Evaluation** (every two years)



We are all stakeholders!

Increased efficiency and improved discovery, access, and use



Arctic Spatial Data Pilot

- Defined land and sea scenarios to demonstrate the value of webservices and to break down information management silos with technical piloting activities:
 - Improve access to reliable data for monitoring, management, emergency preparedness and decision making in the Arctic,
 - Produce a video to showcase how standards and common approaches to data management are deployed.
- Addressed technology issues to meet the realities of Arctic frontier economies, such as in zero/low bandwidth Internet.



Natural Resources
Canada



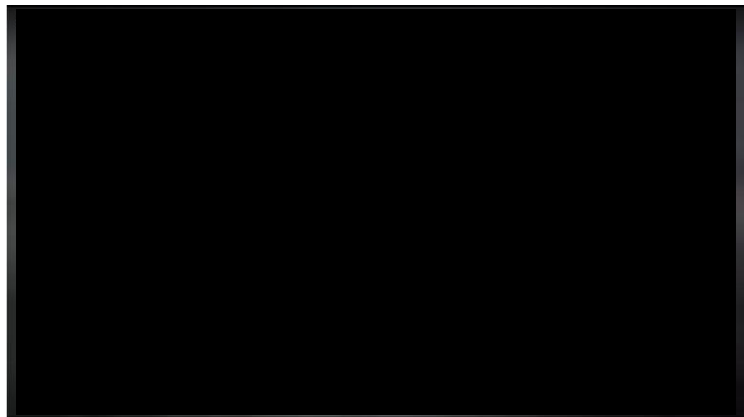
ARCTIC
SDI Arctic Spatial
Data Infrastructure



Arctic Spatial Data Pilot – Summary Video

Key results of the Arctic Spatial Data Pilot. Showcase how standards and common approaches to data management are deployed

- Integrates **highlights from the various scenarios**, adds statements from **key stakeholders interviewed** by OGC
- Quick overview of the **power and value of data and processing capacities served** via **standardized Web services**



Visit <http://www.opengeospatial.org/pub/ArcticSDP/>

Authoritative Topographic Basemap

ARCTIC SDI
Arctic Spatial Data Infrastructure

SEARCH

MAP LAYERS

SELECTED LAYERS 1

MY DATA

MAP PUBLISHING

MAP LEGENDS

USER GUIDE

Provided Directly from the 8 Arctic National Mapping Agencies

5 km
2 mi

[Terms of Use](#) [Data Sources](#)

- Common Cartographic Specification
- A Trusted Source of Detailed Information

Circumpolar Gazetteer

The screenshot displays the Arctic Spatial Data Infrastructure (ASDI) Geoportal interface. The browser address bar shows geoportal.arctic-sdi.org. The page title is "Strategic Documents – Arctic SDI". The main content area features a search bar with the text "longyearbyen" and a "Search" button. Below the search bar, a message states: "You search returned 3 results. Sort search results by clicking a column heading in the table below." A table displays the search results:

Placename	Region	Type
Longyearbyen	Greenland	Other populated places
Longyearbyen	Norway	Populated places
Longyearbyen	Greenland	Natural terrain areas or regions

A search results popup window is visible, showing the results for "Longyearbyen" and listing "Norway" and "Populated places" with a "Close" link. The background is a topographic map of the Arctic region. The left sidebar contains navigation links: "ARCTIC SDI", "Arctic Spatial Data Infrastructure", "SEARCH", "MAP LAYERS", "SELECTED LAYERS" (8), "MY DATA", "MAP PUBLISHING", "MAP LEGENDS", "USER GUIDE", "Register", and "Login". The bottom left corner includes a "5 km" scale bar and links for "Terms of Use" and "Data Sources".



Heli Ursin

Arctic SDI National Contact Point
National Land Survey of Finland

Oskari - Geoportal and Embedded maps

Can be used for:

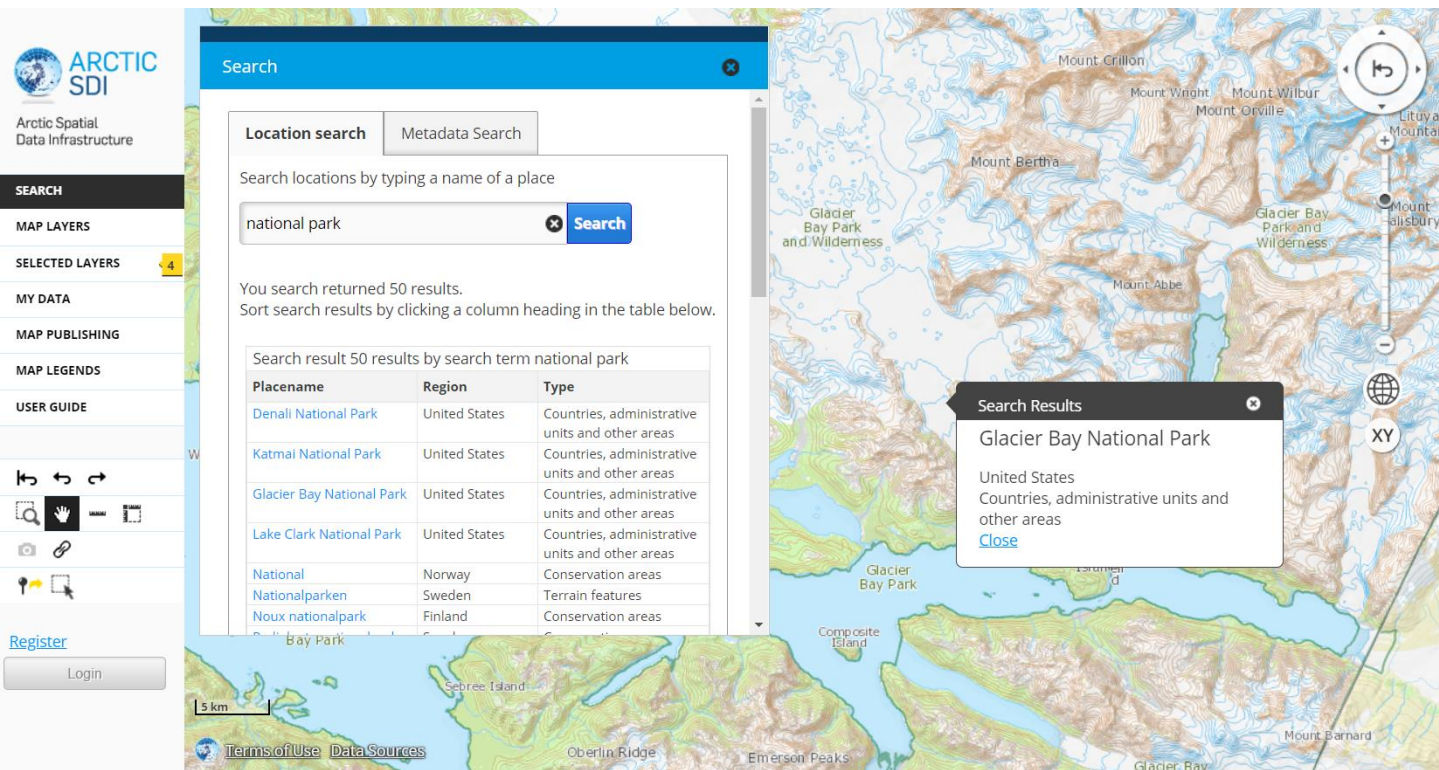
- Setting up Geoportals or Web GIS systems
- Creating Embedded map clients onto other websites very efficiently
- Setting up advanced web-based tools, such as decision-making support services and data analysis tools

Multilingual – English, Swedish & Finnish full coverage, 15 other languages with partial coverage

Open Source - see oskari.org and Oskari [GitHub](https://github.com) for more info



Location Search



Search

Location search | Metadata Search

Search locations by typing a name of a place

national park **Search**

You search returned 50 results.
Sort search results by clicking a column heading in the table below.

Search result 50 results by search term national park

Placename	Region	Type
Denali National Park	United States	Countries, administrative units and other areas
Katmai National Park	United States	Countries, administrative units and other areas
Glacier Bay National Park	United States	Countries, administrative units and other areas
Lake Clark National Park	United States	Countries, administrative units and other areas
Nationalparken	Norway	Conservation areas
Nationalparken	Sweden	Terrain features
Noux nationalpark	Finland	Conservation areas

Search Results


Glacier Bay National Park

United States
Countries, administrative units and other areas
[Close](#)

5 km

[Terms of Use](#) [Data Sources](#)

Metadata Search



Arctic Spatial Data Infrastructure

SEARCH

MAP LAYERS

SELECTED LAYERS 4

MY DATA

MAP PUBLISHING

MAP LEGENDS

USER GUIDE

Register

Login

Search

Location search

Metadata Search

Search Results

Name

Land Water Mask (publication:2014-12-16, update frequency: unknown)

Drinking Water Advisories in First Nations Communities

Trends in water temperature and salinity (a) and density of phytoplankton

Local water quantity in Canadian rivers - Water quantity at monitoring stations in Canada

North America Surface Water Values

Water quality in Canadian rivers - Water quality at monitoring sites, Canada

USGS Watershed Boundary Dataset (WBD) Overlay Map Service from The National Map of Canada

USGS Hydrography (NHD) Overlay Map Service from The National Map of Canada

National Long-term Water Quality Monitoring Data

Releases of harmful substances to water - Releases of mercury to water by federal government in Canada

Releases of harmful substances to water - Releases of lead to water by federal government in Canada

Land and Water Area by Province/Territory and Ecoregion

Land and Water Area by Province/Territory and Ecoregion

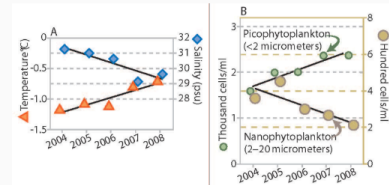
1000 km

Terms of Use Data Sources

Metadata

Trends in water temperature and salinity (a) and density of phytoplankton.

Basic information ISO 19115 metadata Inspire metadata Data quality Actions



TRENDS IN WATER TEMPERATURE AND SALINITY (A) AND DENSITY OF PHYTOPLANKTON.

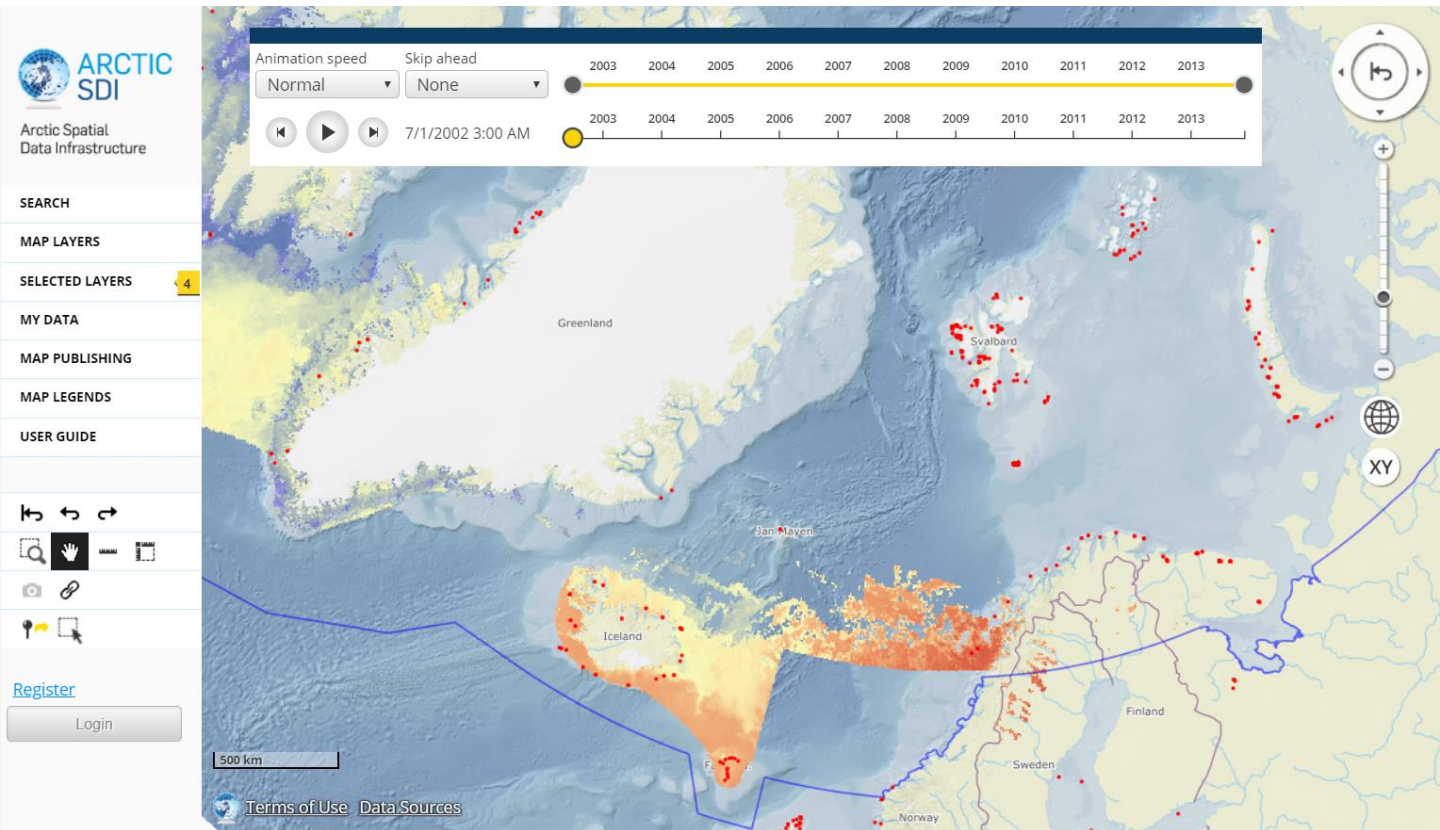
ABSTRACT TEXT (DATA)

Trends in water temperature and salinity (A) and density of phytoplankton of two size ranges (B), Canada Basin, 2004 to 2008.

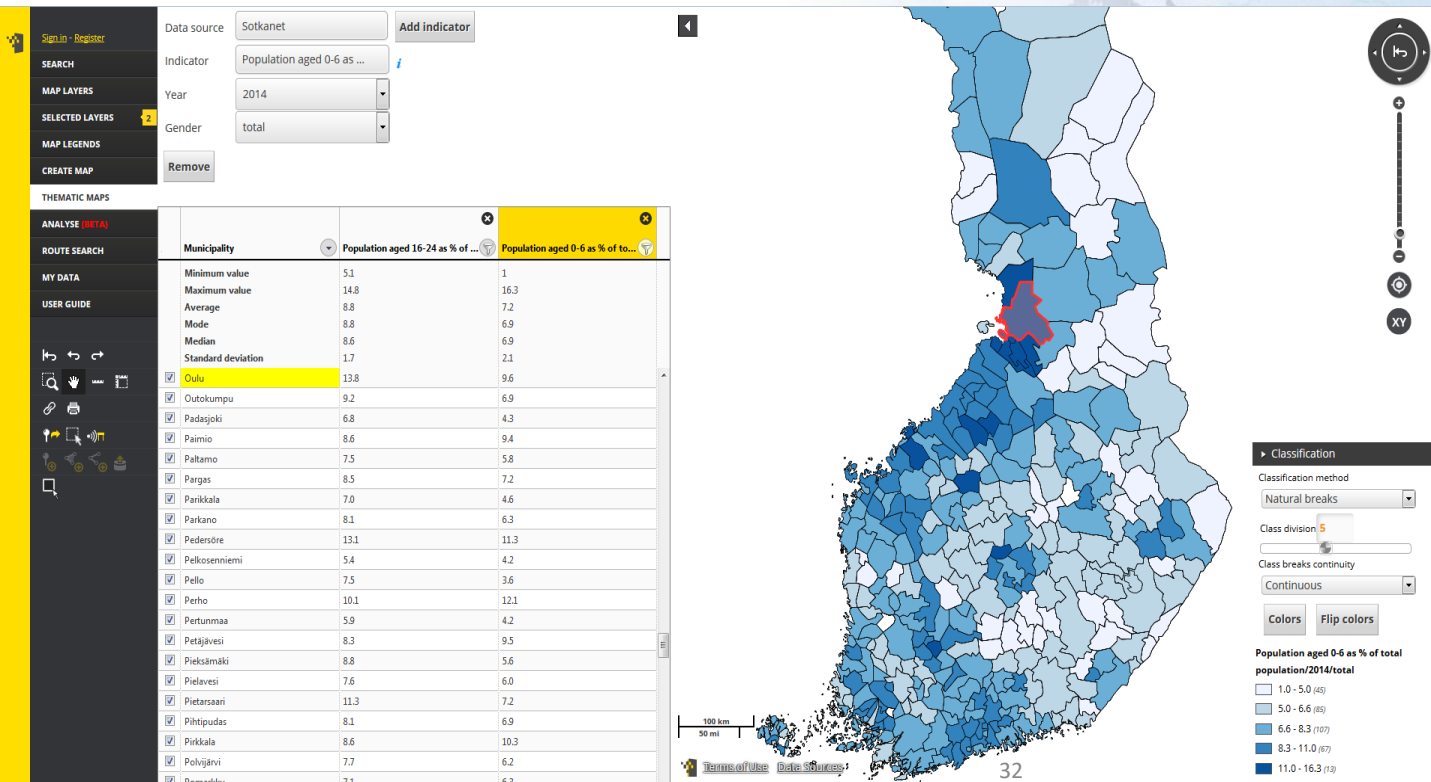
Stratification of the water column increased throughout the Canada Basin over a recent five-year period, accompanied by a change in phytoplankton communities. The upper ocean layer showed trends of increased temperature and decreased salinity (Figure 18A), which combine to make this layer progressively less dense. The layer of water below this did not change in density over this period (not shown). The larger size class of phytoplankton (which would include diatoms) decreased in abundance, while the smaller types of plankton increased (Figure 18B). In addition to the trends shown, nutrient content in the upper ocean water layer decreased. Abundance of microbes (bacteria and similar organisms) that subsist on organic matter increased. Total phytoplankton biomass, however, remained unchanged.

If this trend towards smaller species of phytoplankton and microbes is sustained, it may lead to reduced production of

Time Series (WMS-T)



Future: Combined Spatial and Statistical Data



Arctic SDI Video on YouTube



arctic-sdi.org

Arctic SDI Fact Sheet



GEOSPATIAL DATA – A TOOL FOR BETTER INFORMED DECISIONS AND MORE EFFICIENT ADMINISTRATION IN THE ARCTIC

Improved access to geospatial data can help us better to predict, understand and react to changes in the Arctic. Responses to the impact of climate change and human activities in the Arctic requires accessible and reliable data to facilitate monitoring, management, emergency preparedness and decision making.

Important data sets are produced and distributed by many stakeholders – public and private sector – and most of it can be geographically referenced. A spatial data infrastructure provides tools for data distributors to ensure that their geospatial data is easier for users to access, validate and combine with other data.

The Arctic SDI provides such an infrastructure and its development is facilitated by the National Mapping Agencies of the eight Arctic countries.

The Arctic SDI Geportal and the initial Arctic SDI Reference Map – the basic building blocks in the Arctic Spatial Data Infrastructure are available

The Arctic SDI Geportal providing a web map viewer for use by any interested user to access the Reference Web Map Geospatial Data



Arctic SDI Geportal in the

Arctic SDI 2015-2017 Biennial Report

The On-line [Arctic SDI 2015 – 2017 Biennial Report](#) covers:

- Recognizing Successes and Accomplishments—2015–2017
- Delivering on the Strategic Plan
- SDI Manual for the Arctic
- Outreach and extending collaboration
 - Arctic Council
 - International Hydrographic Organization
 - Arctic Marine Spatial Data Infrastructure
- Delivering Authoritative, Harmonized Data
 - Basemap
 - Circumpolar Gazetteer
- Arctic SDI Geoportal
- OGC Arctic Spatial Data Pilot
- ArcticDEM

arctic-sdi.org
geoportal.arctic-sdi.org



Questions or Comments?