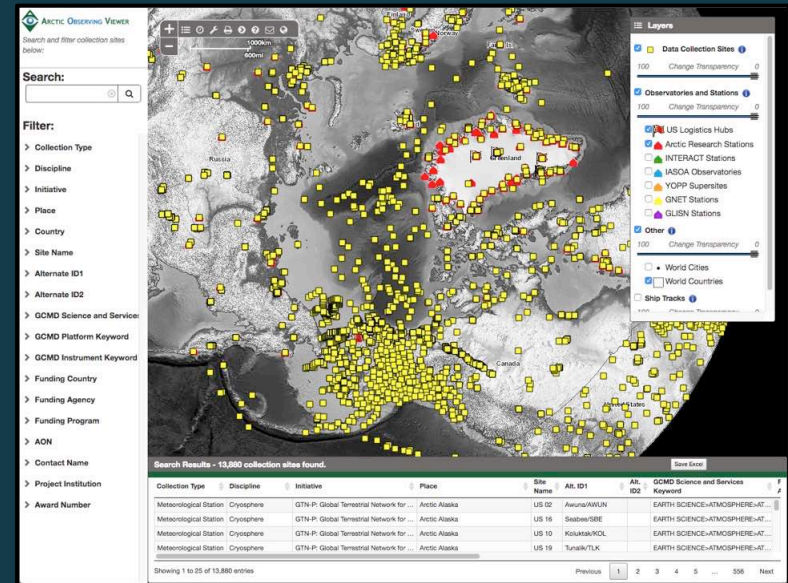
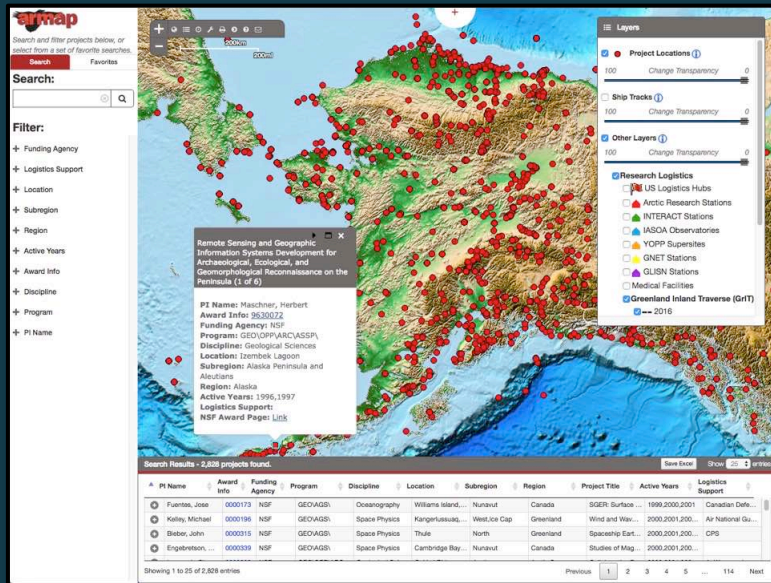


Apps for Arctic Science Planning: ARMAP & AOV



June 6, 2018

William Manley, Allison Gaylord, Craig Tweedie, Naomi Whitty



armap.org



ARCTIC OBSERVING VIEWER

arcticobservingviewer.org

The ARMAP/AOV Team



Craig Tweedie, postdoc, and students

Allison Gaylord

William Manley

Naomi Whitty

CH2M Hill & Synoptek

Funded by:



This work is supported by the National Science Foundation under Contract No. NSFDACS11C1675. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

A Challenge ...

... is knowing who is doing what where.

What research activities, networks, and assets already exist?

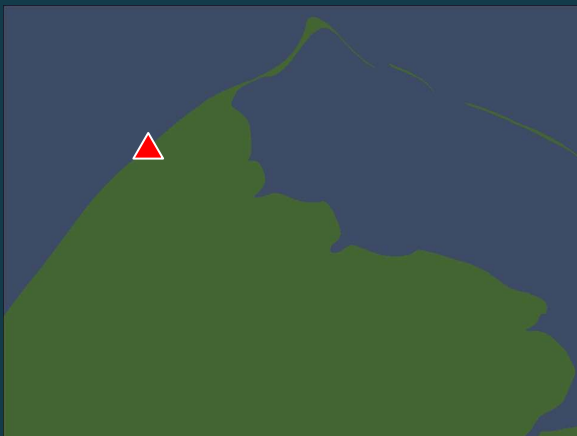
Where are the gaps?

Is there overlap?

How can we better plan, coordinate, and achieve scientific objectives?

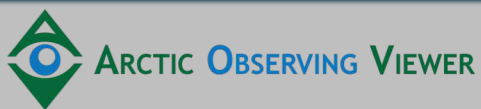
Project - Data Life Cycle

Project Planning



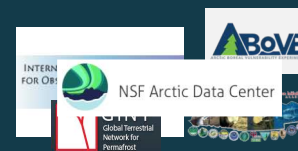
Each **project location** is a logistical base of operation.

Observations & Networks



Each **data collection site** is an instrument, platform, or repeat measurement.

Dataset Usage & Understanding



Each data collection site can have many **datasets**.

Meet User Needs

Project Planning



Who is doing what, when and where?

How do we plan for logistics?

Where are medical facilities, field research stations, ship tracks, airports, etc.?

How do we best achieve the science?

Observations & Networks



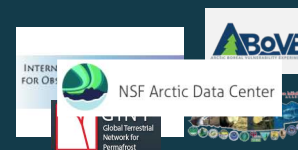
Where are existing data collection sites?

Where are more sites needed?

Who operates and manages existing sites?

Which sites can I use?

Dataset Usage & Understanding



Is this dataset suitable for my research?

Does it cover my area for the right time period?

How was it created?

What are the errors?

Who do I contact with questions?

Scope

Project Planning



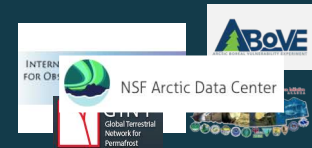
- The big picture of Arctic science
- 2800+ research projects
- For science planning, logistics, and more

Observations & Networks



- A high-resolution view of observing
- 13,000+ observing sites
- For network planning, data discovery, and more

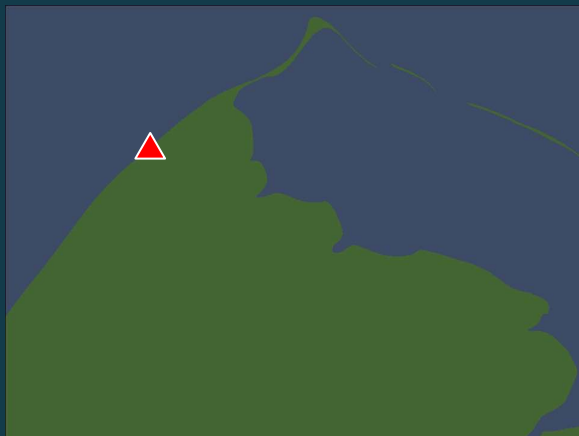
Dataset Usage & Understanding



- By geographic area, discipline, or initiative
- A million+ scientific datasets
- For data discovery, access, reuse, and synthesis

Project - Data Life Cycle

Project Planning



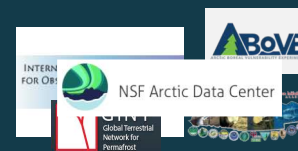
Each **project location** is a logistical base of operation.

Observations & Networks



Each **data collection site** is an instrument, platform, or repeat measurement.

Dataset Usage & Understanding



Each data collection site can have many **datasets**.

Search and filter projects below, or select from a set of favorite searches.

Search

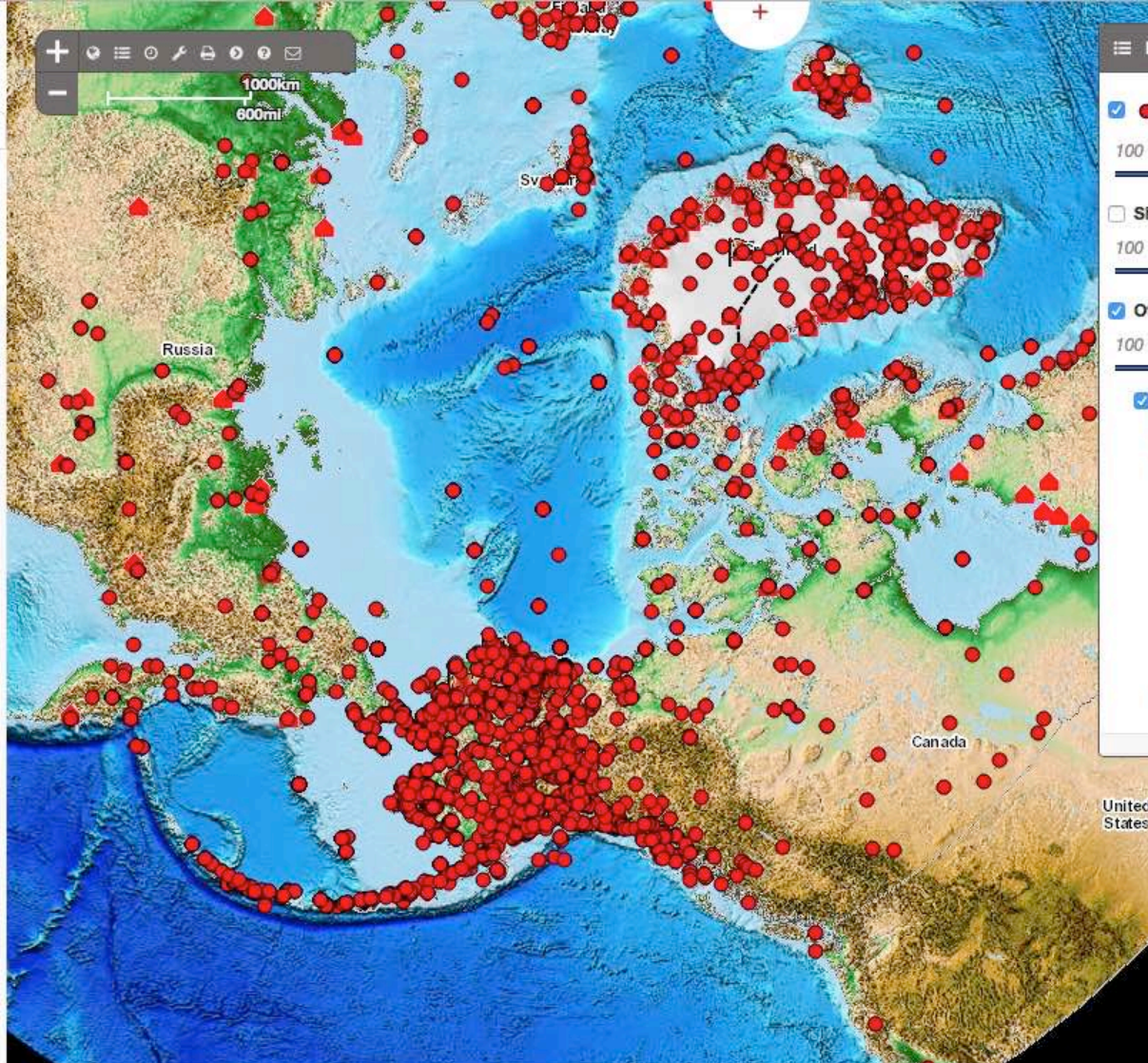
Favorites

Search:



Filter:

- + Funding Agency
- + Logistics Support
- + Location
- + Subregion
- + Region
- + Active Years
- + Award Info
- + Discipline
- + Program
- + PI Name



Layers

- ☒ **Project Locations** ⓘ
100 Change Transparency 0
- ☐ **Ship Tracks** ⓘ
100 Change Transparency 0
- ☒ **Other Layers** ⓘ
100 Change Transparency 0
- ☒ **Research Logistics**
 - ☒ US Logistics Hubs
 - ☒ Arctic Research Stations
 - ☐ INTERACT Stations
 - ☐ IASOA Observatories
 - ☐ YOPP Supersites
 - ☐ GNET Stations
 - ☐ GLISN Stations
 - ☐ Medical Facilities
 - ☒ Greenland Inland Traverse (GrIT)
 - ☒ 2016

Search Results - 2,828 projects found.

Save Excel Show 25 entries

PI Name	Award Info	Funding Agency	Program	Discipline	Location	Subregion	Region	Project Title	Active Years	Logistics Support
Fuentes, Jose	0000173	NSF	GEOVAGS\	Oceanography	Williams Island,...	Nunavut	Canada	SGER: Surface ...	1999,2000,2001	Canadian Defe...
Kelley, Michael	0000196	NSF	GEOVAGS\	Space Physics	Kangerlussuaq,...	West,Ice Cap	Greenland	Wind and Wav...	2000,2001,200...	Air National Gu...
Bieber, John	0000315	NSF	GEOVAGS\	Space Physics	Thule	North	Greenland	Spaceship Eart...	2000,2001,200...	CPS
Engebretson, ...	0000339	NSF	GEOVAGS\	Space Physics	Cambridge Bay...	Nunavut	Canada	Studies of Mag...	2000,2001,200...	

Showing 1 to 25 of 2,828 entries

Previous 1 2 3 4 5 ... 114 Next

Search and filter projects below, or select from a set of favorite searches.

Search

Favorites

Search:

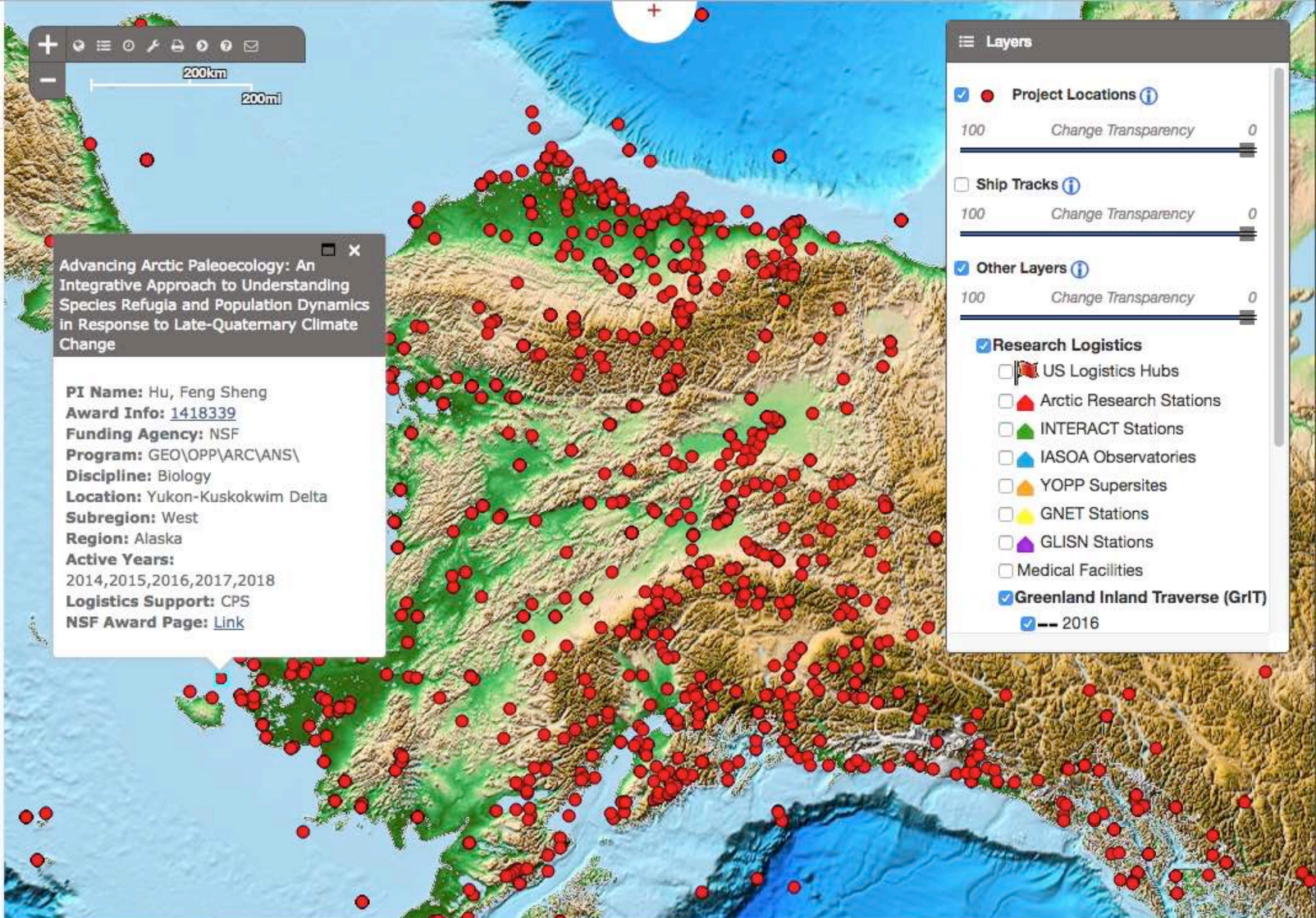


Filter:

- + Funding Agency
- + Logistics Support
- + Location
- + Subregion
- + Region
- + Active Years
- + Award Info
- + Discipline
- + Program
- + PI Name

Advancing Arctic Paleocology: An Integrative Approach to Understanding Species Refugia and Population Dynamics in Response to Late-Quaternary Climate Change

PI Name: Hu, Feng Sheng
Award Info: 1418339
Funding Agency: NSF
Program: GEO\OPP\ARC\ANS\
Discipline: Biology
Location: Yukon-Kuskokwim Delta
Subregion: West
Region: Alaska
Active Years: 2014,2015,2016,2017,2018
Logistics Support: CPS
NSF Award Page: [Link](#)



Layers

- ☒ **Project Locations** ⓘ
 100 Change Transparency 0
- ☐ **Ship Tracks** ⓘ
 100 Change Transparency 0
- ☒ **Other Layers** ⓘ
 100 Change Transparency 0
- ☒ **Research Logistics**
 - ☐ US Logistics Hubs
 - ☐ Arctic Research Stations
 - ☐ INTERACT Stations
 - ☐ IASOA Observatories
 - ☐ YOPP Supersites
 - ☐ GNET Stations
 - ☐ GLISN Stations
 - ☐ Medical Facilities
 - ☒ **Greenland Inland Traverse (GrIT)**
 - ☒ 2016

Search Results - 2,828 projects found.

Save Excel Show 25 entries

PI Name	Award Info	Funding Agency	Program	Discipline	Location	Subregion	Region	Project Title	Active Years	Logistics Support
Fuentes, Jose	0000173	NSF	GEO\VGS\	Oceanography	Williams Island,...	Nunavut	Canada	SGER: Surface ...	1999,2000,2001	Canadian Defe...
Kelley, Michael	0000196	NSF	GEO\VGS\	Space Physics	Kangerlussuaq,...	West,Ice Cap	Greenland	Wind and Wav...	2000,2001,200...	Air National Gu...
Bieber, John	0000315	NSF	GEO\VGS\	Space Physics	Thule	North	Greenland	Spaceship Eart...	2000,2001,200...	CPS
Engelbreton, ...	0000339	NSF	GEO\VGS\	Space Physics	Cambridge Bay...	Nunavut	Canada	Studies of Mag...	2000,2001,200...	

Showing 1 to 25 of 2,828 entries

Previous 1 2 3 4 5 ... 114 Next

Search and filter projects below, or select from a set of favorite searches.

Search

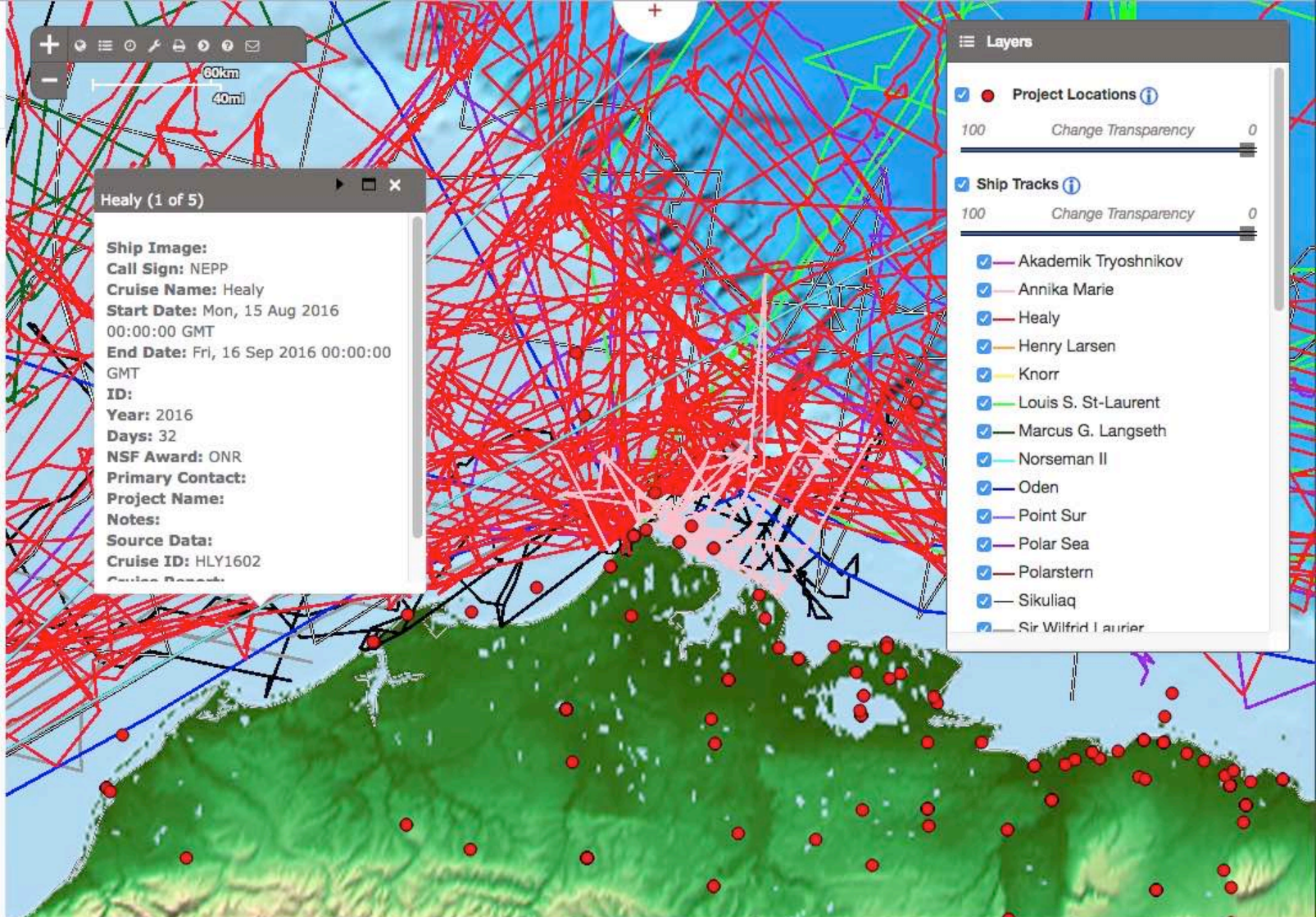
Favorites

Search:



Filter:

- + Funding Agency
- + Logistics Support
- + Location
- + Subregion
- + Region
- + Active Years
- + Award Info
- + Discipline
- + Program
- + PI Name



Layers

- ☒ **Project Locations** ⓘ
 100 Change Transparency 0
- ☒ **Ship Tracks** ⓘ
 100 Change Transparency 0
- ☒ Akademik Tryoshnikov
- ☒ Annika Marie
- ☒ Healy
- ☒ Henry Larsen
- ☒ Knorr
- ☒ Louis S. St-Laurent
- ☒ Marcus G. Langseth
- ☒ Norseman II
- ☒ Oden
- ☒ Point Sur
- ☒ Polar Sea
- ☒ Polarstern
- ☒ Sikuliaq
- ☒ Sir Wilfrid Laurier

Search Results - 2,828 projects found.

Save Excel Show 25 entries

PI Name	Award Info	Funding Agency	Program	Discipline	Location	Subregion	Region	Project Title	Active Years	Logistics Support
Fuentes, Jose	0000173	NSF	GEOVAGS\	Oceanography	Williams Island,...	Nunavut	Canada	SGER: Surface ...	1999,2000,2001	Canadian Defe...
Kelley, Michael	0000196	NSF	GEOVAGS\	Space Physics	Kangerlussuaq,...	West,Ice Cap	Greenland	Wind and Wav...	2000,2001,200...	Air National Gu...
Bieber, John	0000315	NSF	GEOVAGS\	Space Physics	Thule	North	Greenland	Spaceship Eart...	2000,2001,200...	CPS
Engelbreton, ...	0000339	NSF	GEOVAGS\	Space Physics	Cambridge Bay...	Nunavut	Canada	Studies of Mag...	2000,2001,200...	

Showing 1 to 25 of 2,828 entries

Previous 1 2 3 4 5 ... 114 Next

Search and filter projects below, or select from a set of favorite searches.

Search

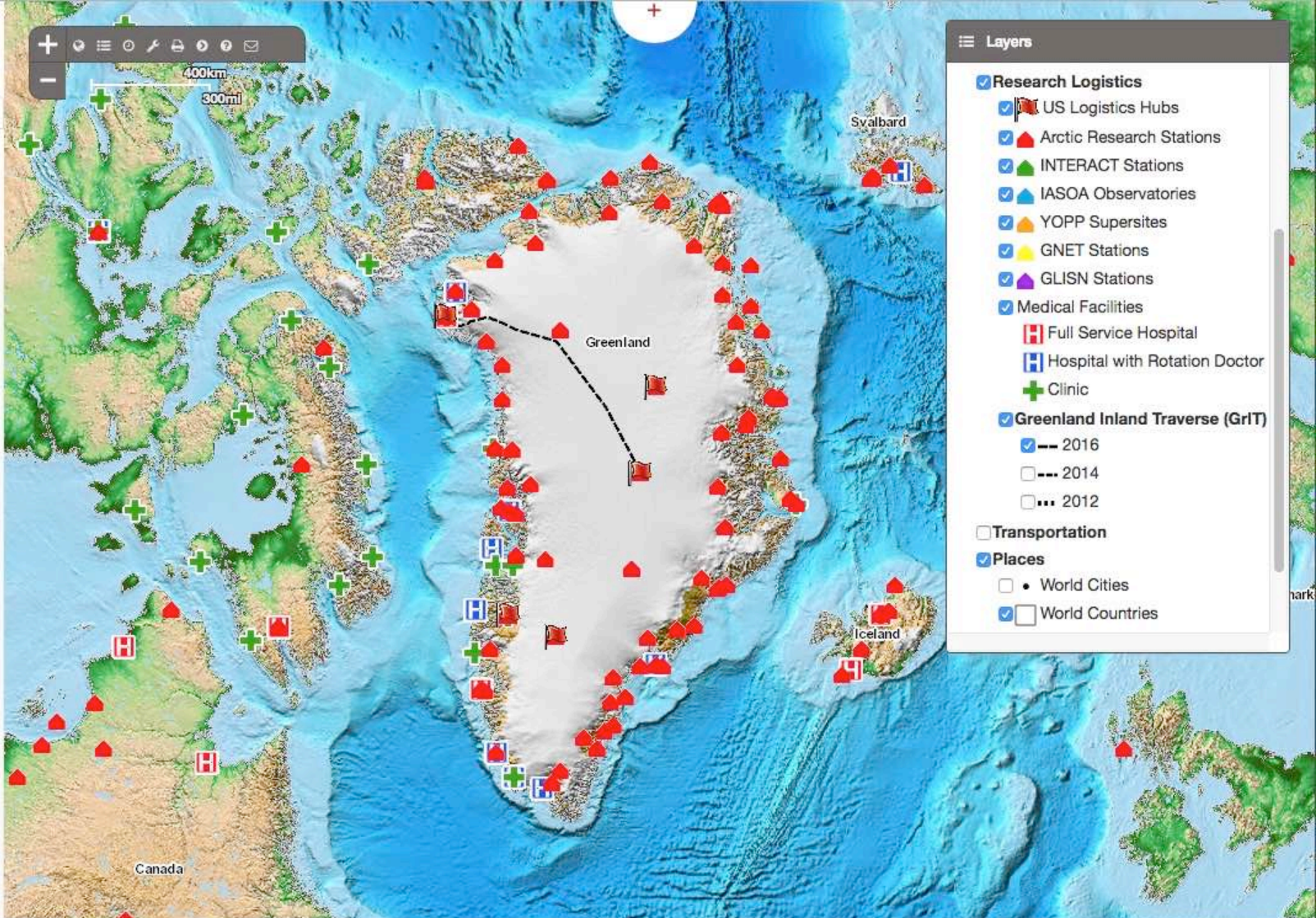
Favorites

Search:



Filter:

- + Funding Agency
- + Logistics Support
- + Location
- + Subregion
- + Region
- + Active Years
- + Award Info
- + Discipline
- + Program
- + PI Name



Layers

☒ Research Logistics

- ☒ US Logistics Hubs
- ☒ Arctic Research Stations
- ☒ INTERACT Stations
- ☒ IASOA Observatories
- ☒ YOPP Supersites
- ☒ GNET Stations
- ☒ GLISN Stations
- ☒ Medical Facilities
 - Full Service Hospital
 - Hospital with Rotation Doctor
 - Clinic
- ☒ Greenland Inland Traverse (GrIT)
 - ☒ 2016
 - ☐ 2014
 - ☐ 2012
- ☐ Transportation
- ☒ Places
 - ☐ World Cities
 - ☒ World Countries

Search Results - 2,828 projects found.

Save Excel Show 25 entries

PI Name	Award Info	Funding Agency	Program	Discipline	Location	Subregion	Region	Project Title	Active Years	Logistics Support
Fuentes, Jose	0000173	NSF	GEOVAGS\	Oceanography	Williams Island,...	Nunavut	Canada	SGER: Surface ...	1999,2000,2001	Canadian Defe...
Kelley, Michael	0000196	NSF	GEOVAGS\	Space Physics	Kangerlussuaq,...	West,Ice Cap	Greenland	Wind and Wav...	2000,2001,200...	Air National Gu...
Bieber, John	0000315	NSF	GEOVAGS\	Space Physics	Thule	North	Greenland	Spaceship Eart...	2000,2001,200...	CPS
Engebretson, ...	0000339	NSF	GEOVAGS\	Space Physics	Cambridge Bay...	Nunavut	Canada	Studies of Mag...	2000,2001,200...	

Showing 1 to 25 of 2,828 entries

Previous 1 2 3 4 5 ... 114 Next



Circumarctic

All projects for 2018

All projects for 2017

NSF funded for 2018

NSF funded for 2017

NSF funded for 2010-2018

CPS supported for 2018

CPS supported for 2017



Alaska

All projects for 2018

All projects for 2017

NSF funded for 2018

NSF funded for 2017

NSF funded for 2010-2018

CPS supported for 2018

CPS supported for 2017



Greenland

All projects for 2018

All projects for 2017

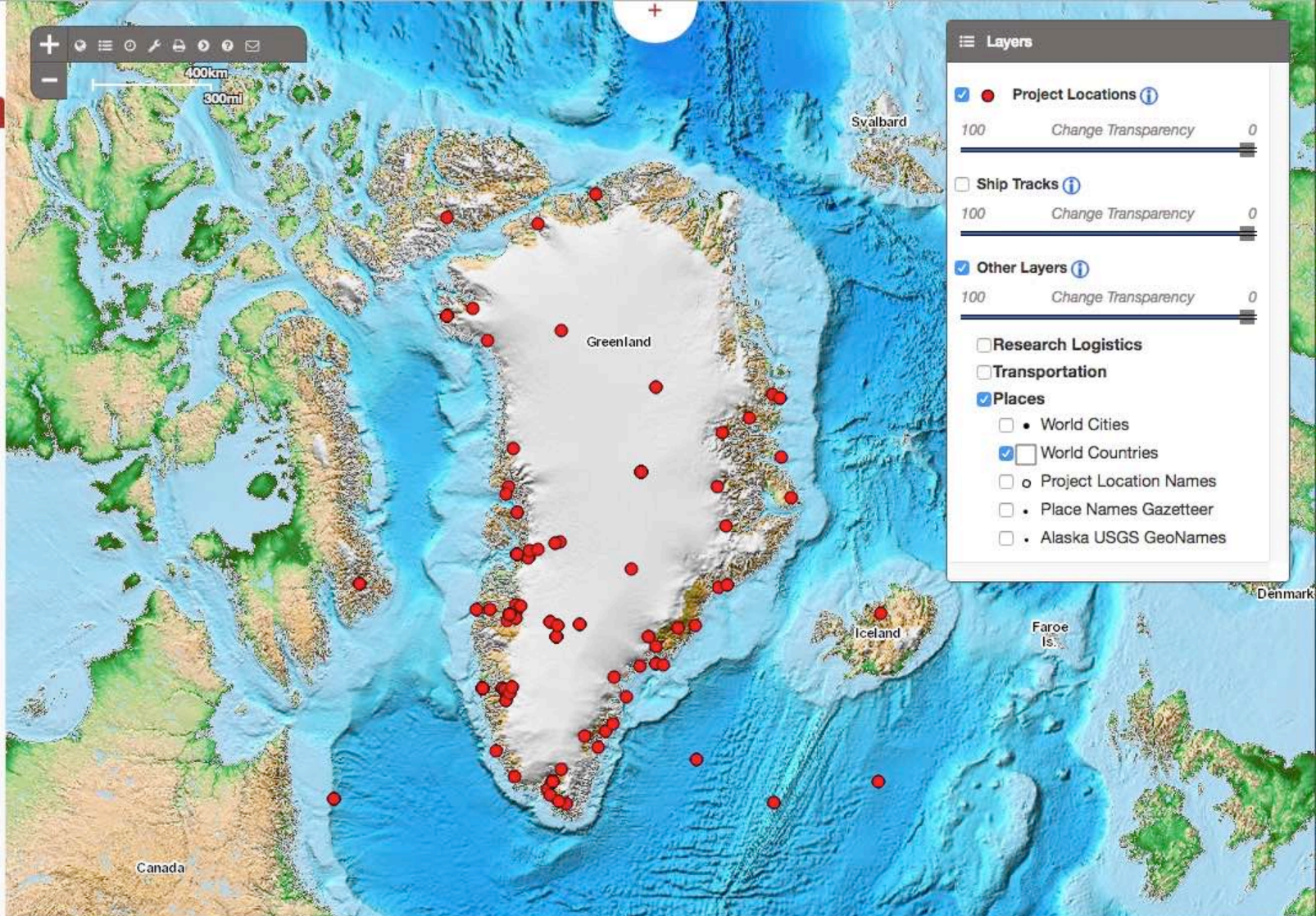
[NSF funded for 2018](#)

NSF funded for 2017

NSF funded for 2010-2018

CPS supported for 2018

CPS supported for 2017



Layers

☒ **Project Locations** ⓘ
 100 Change Transparency 0

☐ **Ship Tracks** ⓘ
 100 Change Transparency 0

☒ **Other Layers** ⓘ
 100 Change Transparency 0

☐ Research Logistics
☐ Transportation
☒ **Places**
☐ World Cities
☒ World Countries
☐ Project Location Names
☐ Place Names Gazetteer
☐ Alaska USGS GeoNames

Search Results - 54 projects found.

Save Excel

Show 25 entries

▲ PI Name	▲ Award Info	▲ Funding Agency	▲ Program	▲ Discipline	▲ Location	▲ Subregion	▲ Region	▲ Project Title	▲ Active Years	▲ Logistics Support
LaBelle, James	1147699	NSF	GEO\AGS\	Space Physics	Toolik, Churchill...	Arctic Alaska, M...	Alaska, Canada...	Collaborative R...	2012, 2013, 201...	CPS
Lozier, Susan	1259103	NSF	GEO\OCE\	Oceanography	Labrador Sea, ...	North Atlantic, ...	Arctic Ocean a...	SAVI: Collabora...	2013, 2014, 201...	CPS
Pickart, Robert	1259618	NSF	GEO\OCE\	Oceanography	Labrador Sea, ...	North Atlantic, ...	Arctic Ocean a...	SAVI: Collabora...	2013, 2014, 201...	CPS
Miller, Meghan	1261833	NSF	GEO\EAR\	Geological Scie...	Atqasuk, Utqia?...	Arctic Alaska, W...	Alaska, Greenland	2013-2018 UN...	2013, 2014, 201...	CPS

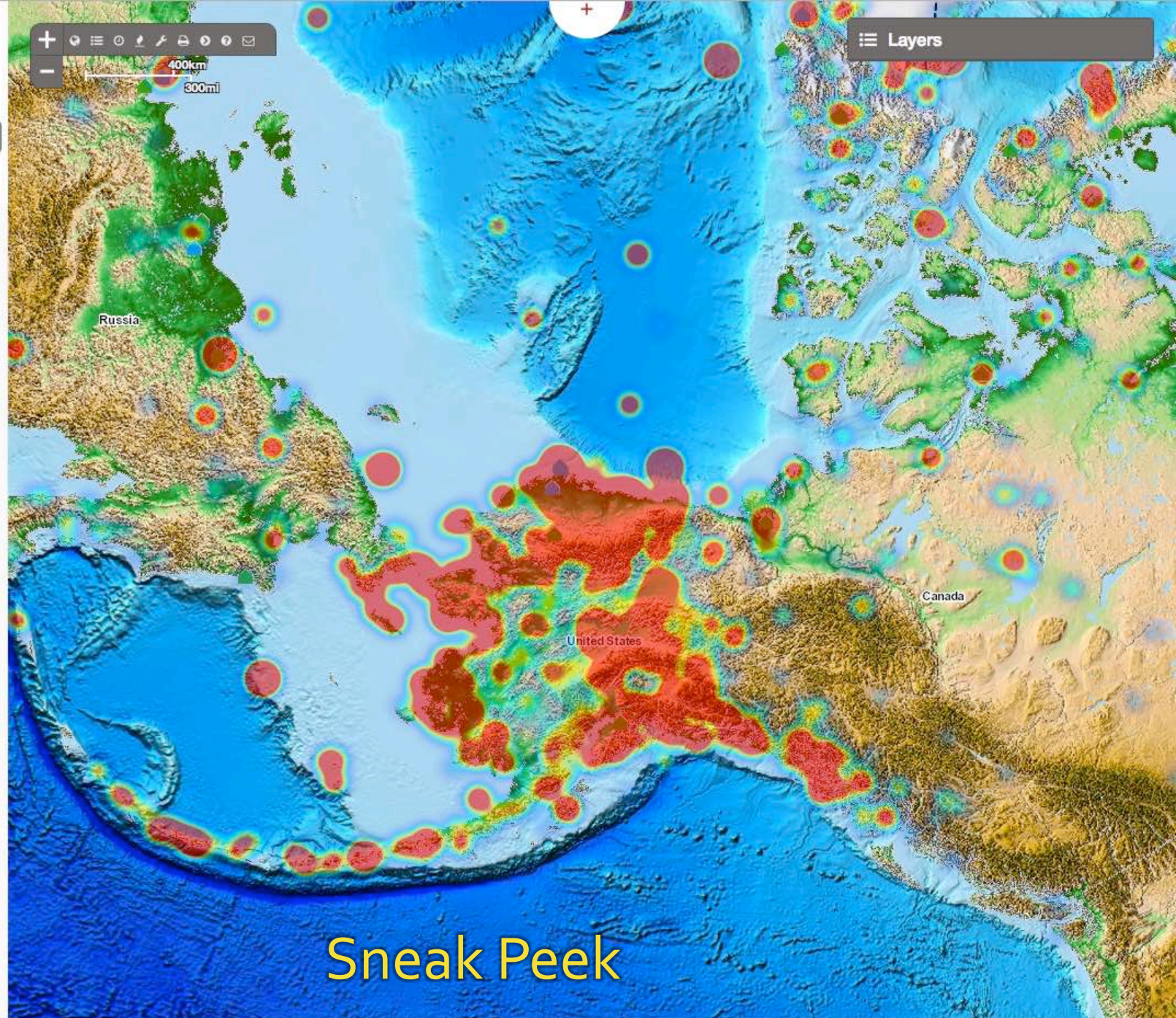
Showing 1 to 25 of 54 entries

Previous 1 2 3 Next

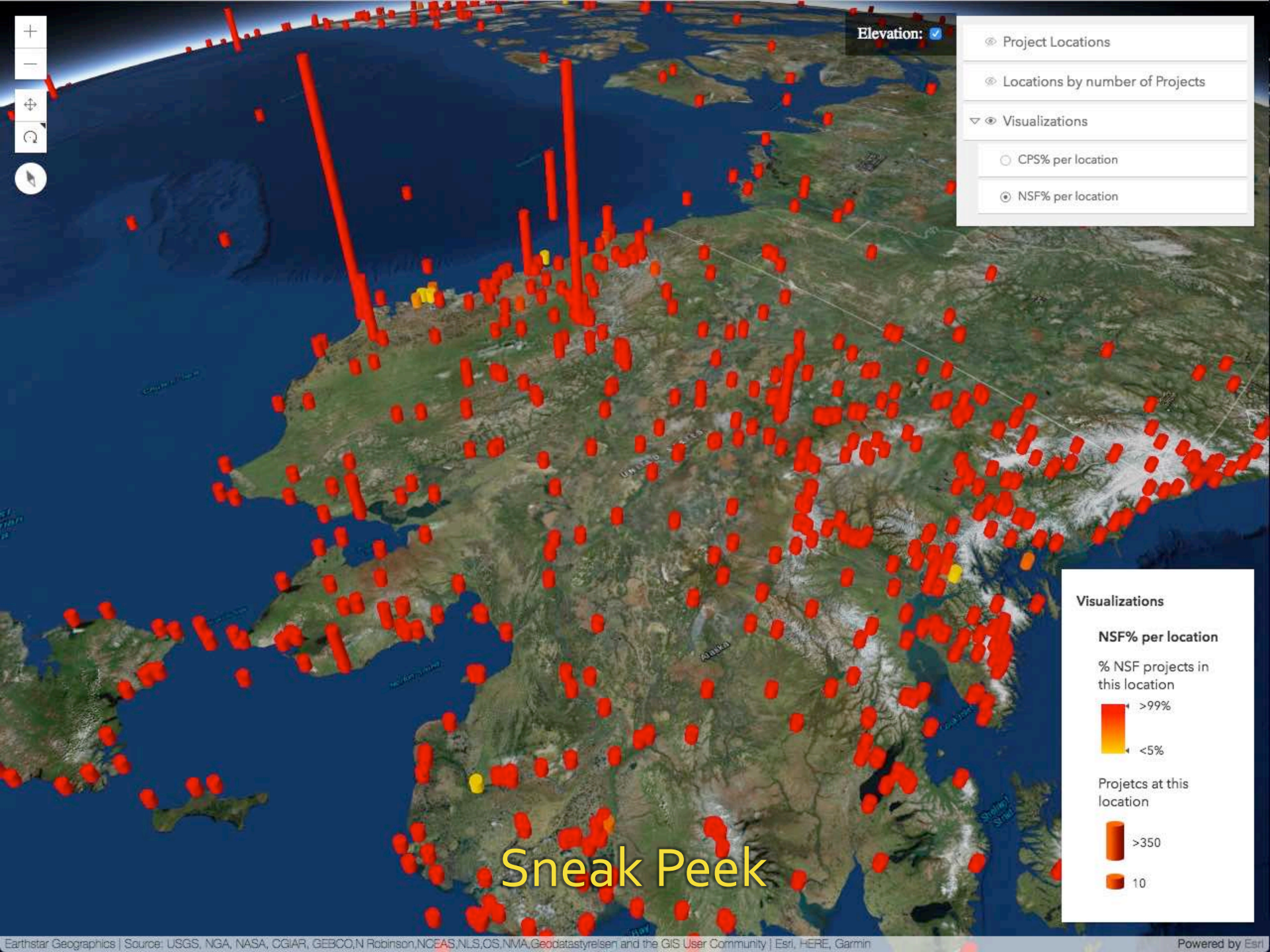
Search:

Filter:

- + Funding Agency
- + Logistics Support
- + Location
- + Subregion
- + Region
- + Active Years
- + Award Info
- + Discipline
- + Program
- + PI Name



Sneak Peek



Elevation: ☒

☐ Project Locations

☐ Locations by number of Projects

☒ Visualizations

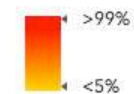
☐ CPS% per location

☒ NSF% per location

Visualizations

NSF% per location

% NSF projects in this location



Projects at this location



Sneak Peek

What's in ARMAP?

- NSF and 17 other agencies
- 132 ship tracks
- 2800+ research projects
- 1300+ project locations

Project Details in ARMAP

Funding Agency
Funding Program
Logistics Provider

Discipline

Region
Subregion
Location

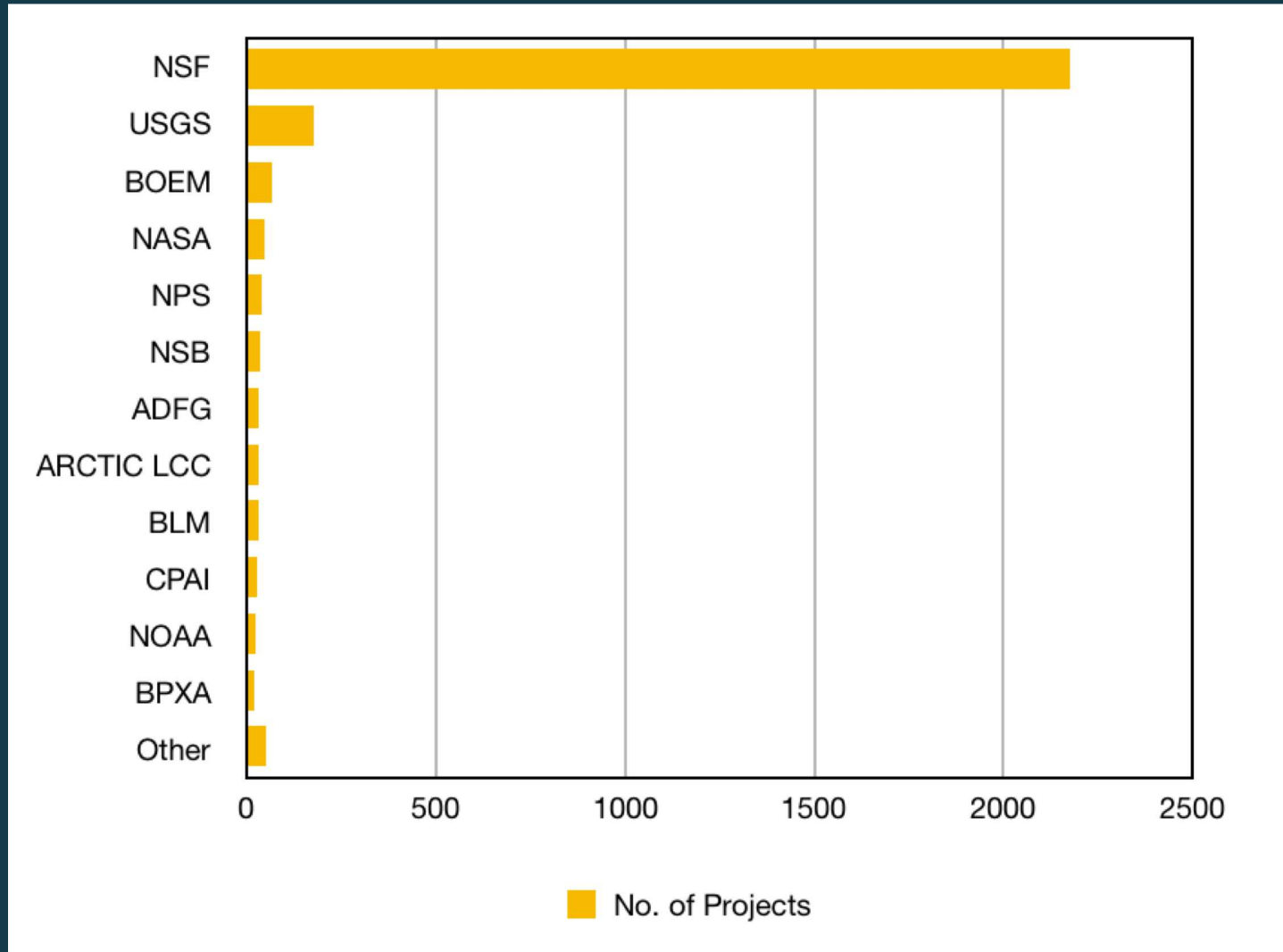
Project Title
Award Number
Institution
PI Name

PI Contact Info

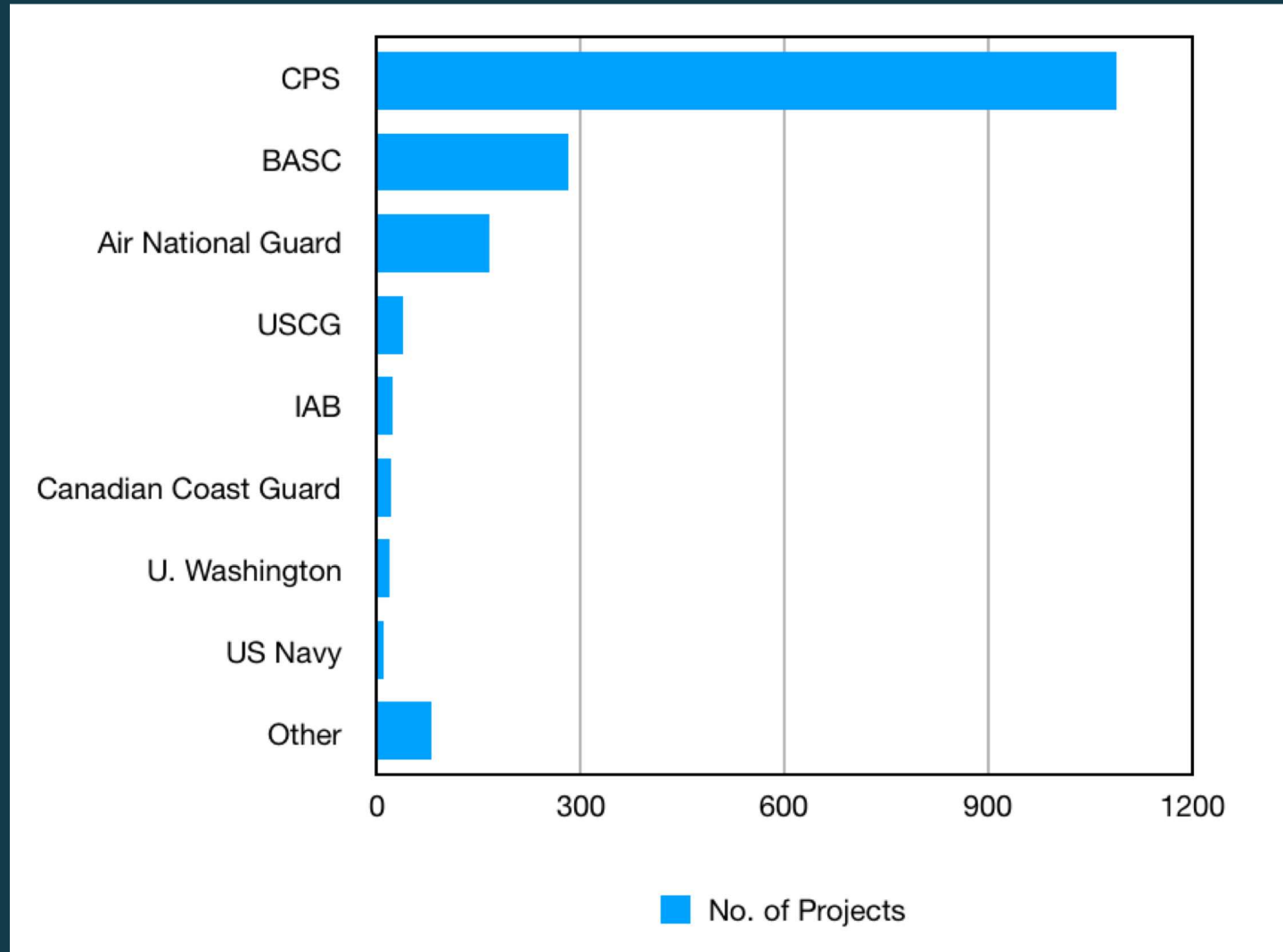
Active Years

Links to logistics reports, project summaries, data, and more

Agencies in ARMAP



Logistics Providers in ARMAP



Disciplines in ARMAP

Biology

Cryosphere

Data Management

Education and Outreach

Geological Sciences

Instrument Development

Meteorology and Climate

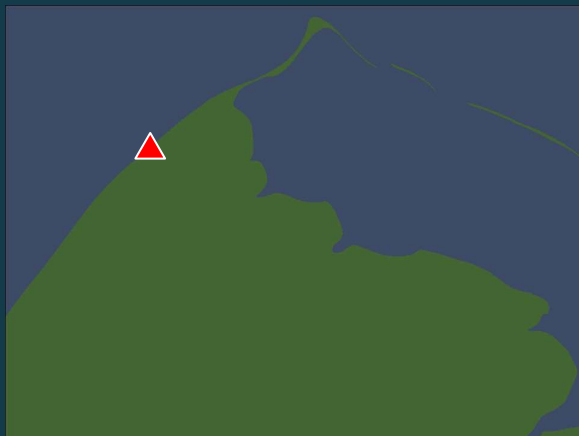
Oceanography

Social and Human Sciences

Space Physics

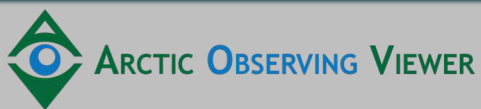
Project - Data Life Cycle

Project Planning



Each **project location** is a logistical base of operation.

Observations & Networks



Each **data collection site** is an instrument, platform, or repeat measurement.

Dataset Usage & Understanding



Each data collection site can have many **datasets**.

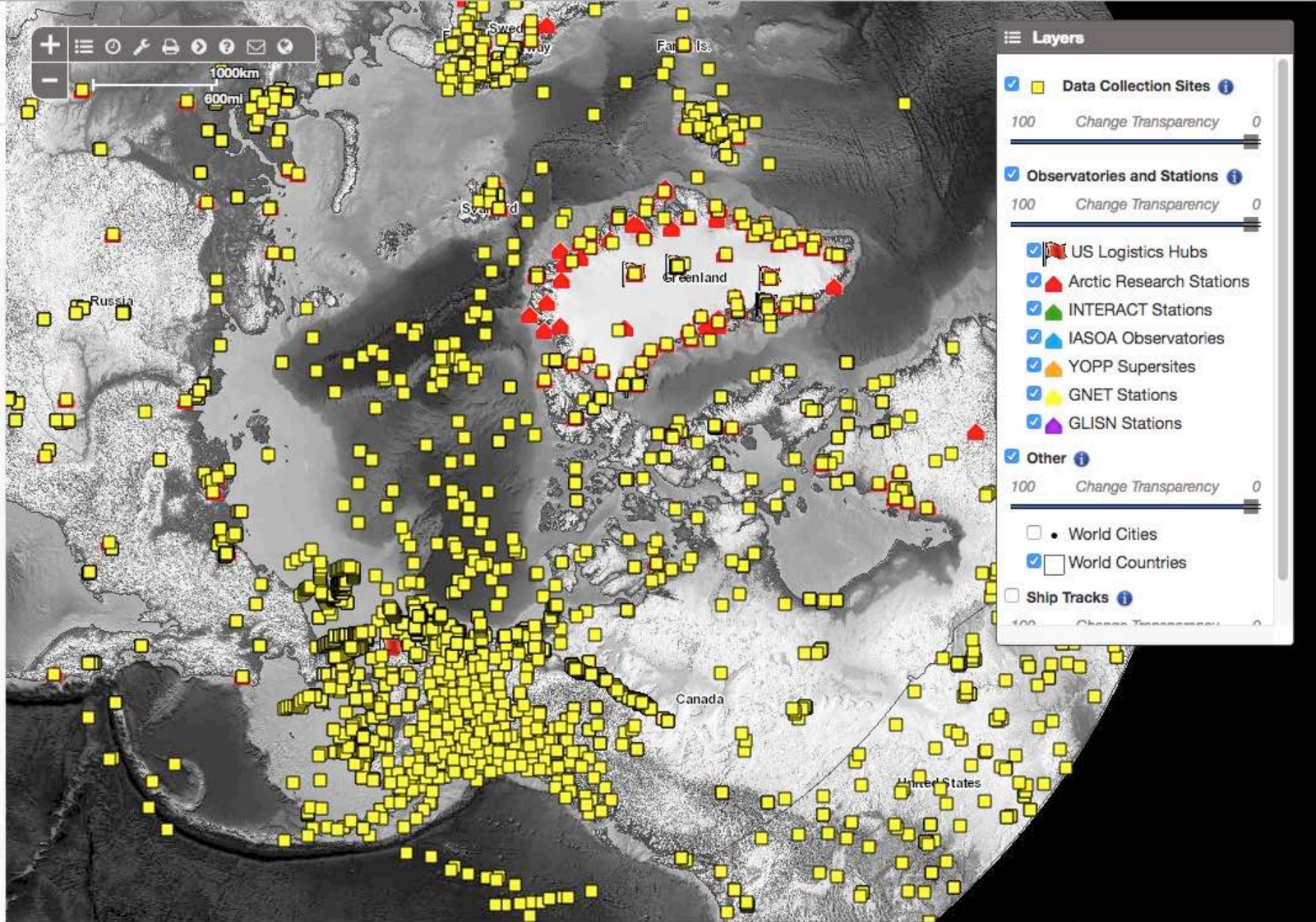
Search and filter collection sites below:

Search:



Filter:

- > Collection Type
- > Discipline
- > Initiative
- > Place
- > Country
- > Site Name
- > Alternate ID1
- > Alternate ID2
- > GCMD Science and Services
- > GCMD Platform Keyword
- > GCMD Instrument Keyword
- > Funding Country
- > Funding Agency
- > Funding Program
- > AON
- > Contact Name
- > Project Institution
- > Award Number



Search Results - 13,880 collection sites found.

Save Excel

Collection Type	Discipline	Initiative	Place	Site Name	Alt. ID1	Alt. ID2	GCMD Science and Services Keyword	F
Meteorological Station	Cryosphere	GTN-P: Global Terrestrial Network for ...	Arctic Alaska	US 02	Awuna/AWUN		EARTH SCIENCE>ATMOSPHERE>AT...	
Meteorological Station	Cryosphere	GTN-P: Global Terrestrial Network for ...	Arctic Alaska	US 16	Seabee/SBE		EARTH SCIENCE>ATMOSPHERE>AT...	
Meteorological Station	Cryosphere	GTN-P: Global Terrestrial Network for ...	Arctic Alaska	US 10	Koluktak/KOL		EARTH SCIENCE>ATMOSPHERE>AT...	
Meteorological Station	Cryosphere	GTN-P: Global Terrestrial Network for ...	Arctic Alaska	US 19	Tunalik/TLK		EARTH SCIENCE>ATMOSPHERE>AT...	

Showing 1 to 25 of 13,880 entries

Previous 1 2 3 4 5 ... 556 Next

Search and filter collection sites below:

Search:

Filter:

> Collection Type

> Discipline

> Initiative 1

> Place

> Country

> Site Name

> GCMD Science and Services

> Funding Country

> Funding Agency

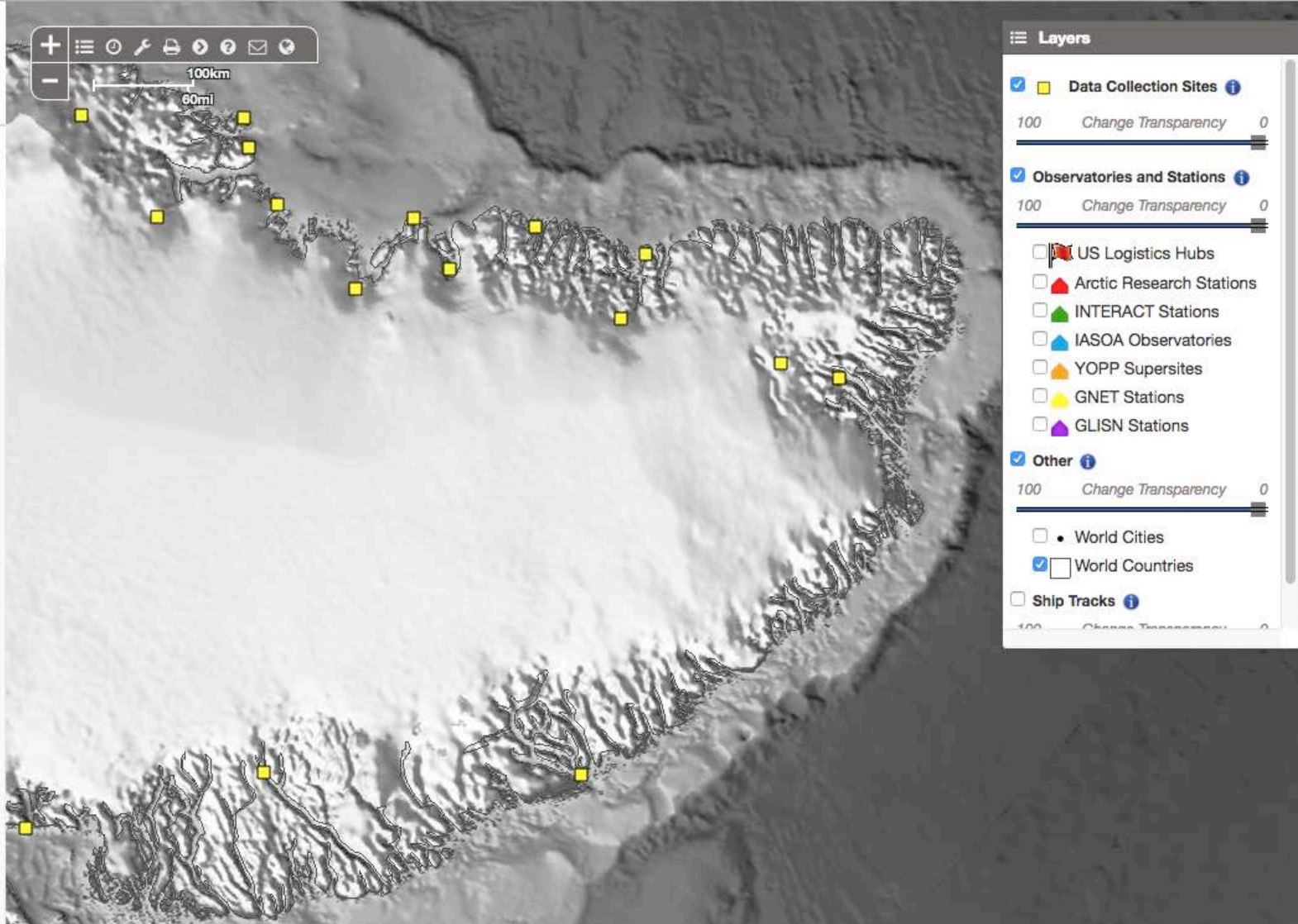
> Funding Program

> AON

> Contact Name

> Project Institution

> Award Number



Search Results - 44 collection sites found.

Save Excel

Collection Type	Discipline	Initiative	Place	Site Name	Alt. ID1	Alt. ID2	GCMD Science and Services Keyword
Global Positioning (GPS) Station	Cryosphere	GNET: The Greenland GPS Network	Narsarsuaq, West	Narsarsuaq, West, Greenland			EARTH SCIENCE>CLIM
Global Positioning (GPS) Station	Cryosphere	GNET: The Greenland GPS Network	Niviarsiat Nunatak North (NNVN), East	Niviarsiat Nunatak North (NNVN), East...			EARTH SCIENCE>CLIM
Global Positioning (GPS) Station	Cryosphere	GNET: The Greenland GPS Network	Timmiarmiut, East	Timmiarmiut, East, Greenland			EARTH SCIENCE>CLIM
Global Positioning (GPS) Station	Cryosphere	GNET: The Greenland GPS Network	Upper Timmiarmiut Glacier, East	Upper Timmiarmiut Glacier, East, Gre...			EARTH SCIENCE>CLIM

Showing 1 to 25 of 44 entries

Previous 1 2 Next

Search and filter collection sites below:

Search:



Filter:

> Collection Type

> Discipline

> Initiative 1

GNET: The Greenland GPS Network

> Place

> Country

> Site Name

> GCMD Science and Services

> Funding Country

> Funding Agency

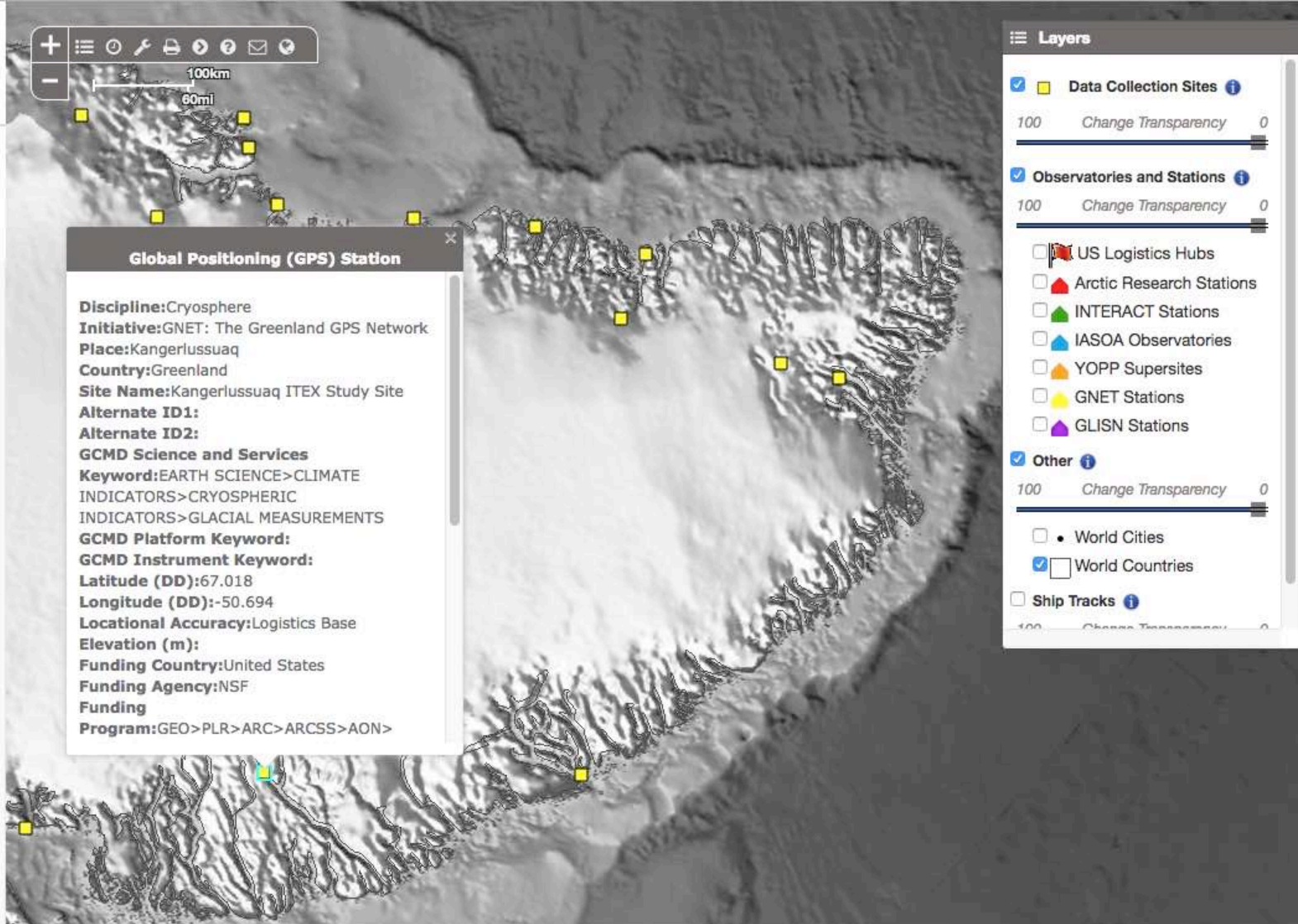
> Funding Program

> AON

> Contact Name

> Project Institution

> Award Number



Global Positioning (GPS) Station

Discipline: Cryosphere
Initiative: GNET: The Greenland GPS Network
Place: Kangerlussuaq
Country: Greenland
Site Name: Kangerlussuaq ITEX Study Site
Alternate ID1:
Alternate ID2:
GCMD Science and Services
Keyword: EARTH SCIENCE>CLIMATE INDICATORS>CRYOSPHERIC INDICATORS>GLACIAL MEASUREMENTS
GCMD Platform Keyword:
GCMD Instrument Keyword:
Latitude (DD): 67.018
Longitude (DD): -50.694
Locational Accuracy: Logistics Base
Elevation (m):
Funding Country: United States
Funding Agency: NSF
Funding
Program: GEO>PLR>ARC>ARCSS>AON>

Layers

☒ Data Collection Sites

100 Change Transparency 0

☒ Observatories and Stations

100 Change Transparency 0

- ☐ US Logistics Hubs
- ☐ Arctic Research Stations
- ☐ INTERACT Stations
- ☐ IASOA Observatories
- ☐ YOPP Supersites
- ☐ GNET Stations
- ☐ GLISN Stations

☒ Other

100 Change Transparency 0

- ☐ World Cities
- ☒ World Countries

☐ Ship Tracks

Search Results - 44 collection sites found.

Save Excel

Collection Type	Discipline	Initiative	Place	Site Name	Alt. ID1	Alt. ID2	GCMD Science and Services Keyword
Global Positioning (GPS) Station	Cryosphere	GNET: The Greenland GPS Network	Narsarsuaq, West	Narsarsuaq, West, Greenland			EARTH SCIENCE>CLIM
Global Positioning (GPS) Station	Cryosphere	GNET: The Greenland GPS Network	Niviarsiat Nunatak North (NNVN), East	Niviarsiat Nunatak North (NNVN), East...			EARTH SCIENCE>CLIM
Global Positioning (GPS) Station	Cryosphere	GNET: The Greenland GPS Network	Timmiarmiut, East	Timmiarmiut, East, Greenland			EARTH SCIENCE>CLIM
Global Positioning (GPS) Station	Cryosphere	GNET: The Greenland GPS Network	Upper Timmiarmiut Glacier, East	Upper Timmiarmiut Glacier, East, Gre...			EARTH SCIENCE>CLIM

Showing 1 to 25 of 44 entries

Previous 1 2 Next

What's in AOV?

- Focused on “Arctic Observing”
- More international
- >13,900 observation sites
- Project information from ARMAP
- Plus additional information for sites

Site Details in AOV

Initiative

Collection Type

GCMD Science and Services Keyword

GCMD Platform Keyword

GCMD Instrument Keyword

Site Name

Place

Country

Latitude & Longitude

Locational Accuracy

Elevation

Alternate ID1

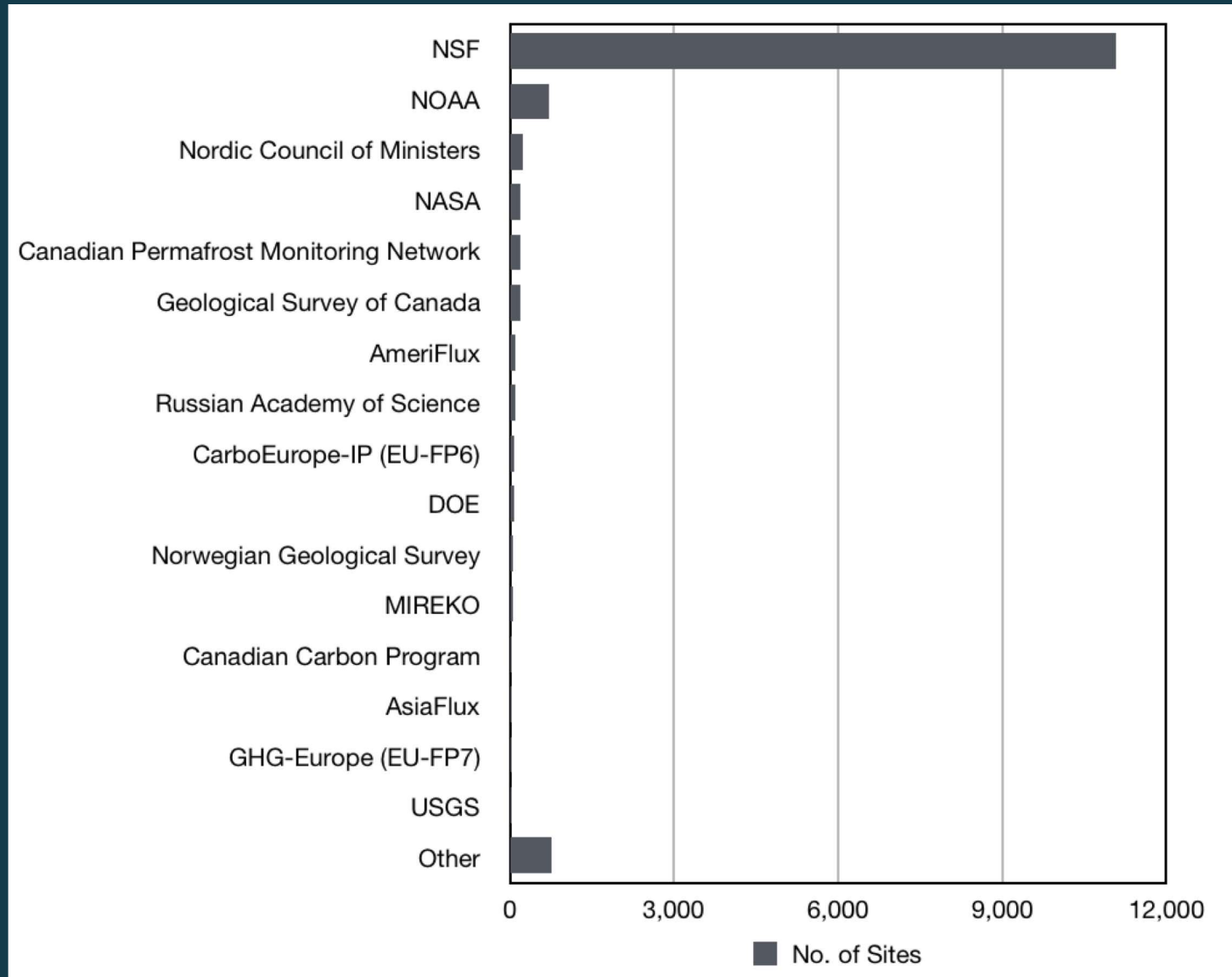
Alternate ID2

Site Start Year

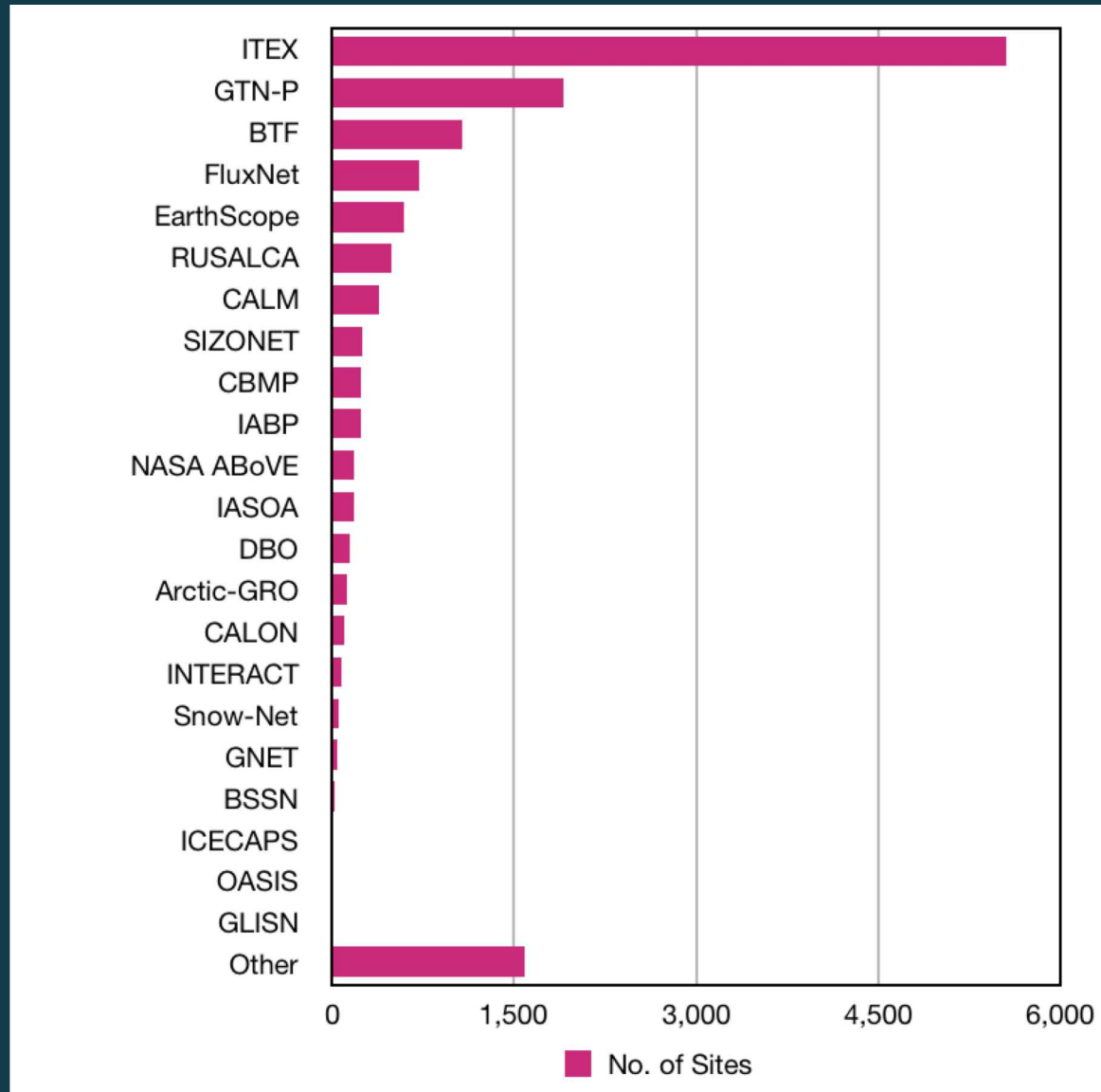
Site End Year

Links to logistics reports, project summaries, data, and more

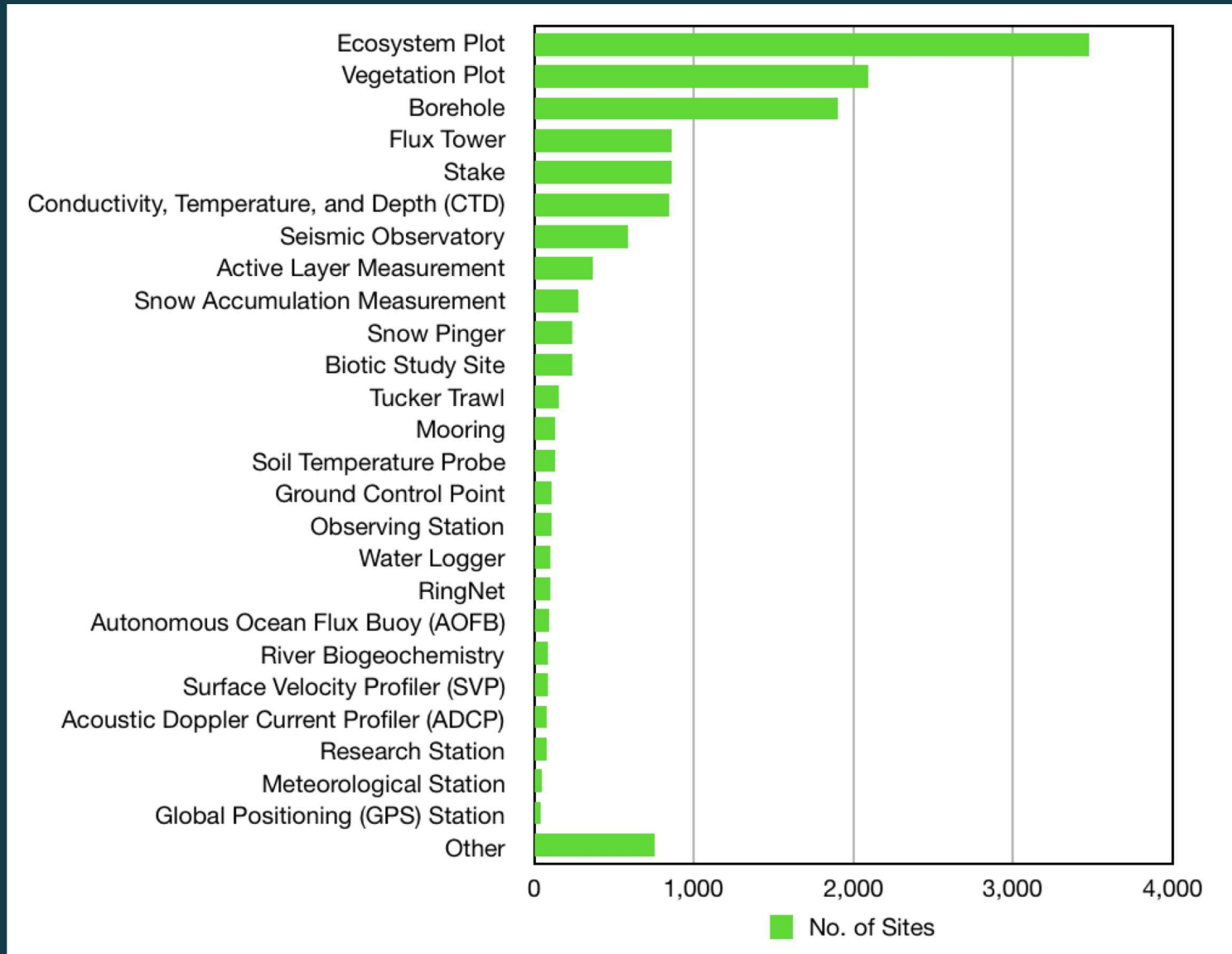
Agencies in AOV



Initiatives in AOV




Collection Types in AOV



Add Your Sites to AOV

Home Partners About Interoperability Collaborate



ARCTIC OBSERVING VIEWER

collaborative mapping of data collection sites

Collaborate

Would you like to showcase your sites? Increase visibility for your organization? Strategically assess your monitoring activities within the context of other data collection networks in order to optimize resources and opportunities?

If so, please consider joining a network of agencies and organizations to share information for both individual and collective benefit.

Add Your Sites to AOV

While pursuing interoperability through compatible metadata and web services, it can be challenging to share information through "static" handovers. To this end, you can enter data collection site information into the AOV. Or you can upload a file. See below.

Please note that "data collection site" information is a new level of "granularity" for metadata. This level of metadata can be utilized with a minimum set of additional fields relating to monitoring activities (e.g., approach being adopted by AOV, ADIwg, and others for ease of implementation). And, this information can be harvested from dataset-level metadata.

After you contribute information, it will go through a period of QA/QC, harmonizing, and then be included in the viewer and web services. Your organization will achieve visibility with the AOV.

AOV_Data_Contribution_Template_v4-2.xlsx

Home Insert Page Layout Formulas Data Review View

Calibri (Body) 11

Conditional Formatting Format as Table Cell Styles

Number

Cells Editing

A17

	A	B	C	D	E	F	G	H	I	J
1	Data Collection Sites as Points									
2										
3	Fill in below if your data collection sites are points.									
4	Use the other tabs if your sites are better represented as transects (lines) or areas (polygons).									
5	Hover over the fields below for definitions to assist with populating entries.									
6	*Some of the fields also have drop-down menus to easily select from recommended entries. See also the Pick Lists tab.									
7	For Latitude and Longitude in Decimal Degrees: A handy Coordinator Converter can be accessed through the Polar Geospatial Center at http://www.pgc.umn.edu/tools/conversion .									
8	For GCMD Science and Services Keywords: A useful, secondary resource is at http://gcmd.arcticdc.org .									
9										
10	An Example for Reference:									
11	Site Name	Alternate ID1	Alternate ID2	Country	Place	Latitude (DD)	Longitude (DD)	Locational Accuracy	Elevation (m)	Site Start Year
12	ITEX Soil Temperature Probe Barrow Dry Site BD E T2			United States	Barrow, Arctic Alaska, Alaska	71.3135	-156.5987	DGPS	4.42	1995
13										
14	Your Data Collection Sites (Points):									
15	Site Name	Alternate ID1	Alternate ID2	Country	Place	Latitude (DD)	Longitude (DD)	Locational Accuracy	Elevation (m)	Site Start Year
16										
17										
18										
19										
20										
21										
22										
23										

Introduction Project Info **Data Collection Sites-Points** Data Collection Sites-Transects Data Collection Sites-Areas Pick Lists

Ready 100%

template spreadsheet

or release compatible, public-facing web services

Web Services

armap
Arctic Research Mapping Application

HOME LAUNCH VIEWER TEXT SEARCH MAP GALLERY **WEB SERVICES** ABOUT RESOURCES

Web Services

Connect to web services for live, updated data & information.

For use in your own applications or databases, you may connect to ARMAP's suite of web services – data streams direct from ARMAP's servers. They can be opened in a variety of data management systems, GIS applications, and other software packages. They allow users and organizations quick access to comprehensive, remotely updated data, including information on field-based research, a base map, other Arctic map layers, and more. The web services are available in a variety of open, community-adopted formats and standards to promote cross-platform data sharing and re-use.

Go to:
[Field Research Project Locations](#) | [Location Placenames](#)
[Arctic Base Map](#) | [Arctic Countries](#) | [Arctic World Cities](#) | [Map Projections](#)

Field Research Project Locations

This web service contains the locations and high-level project information for field-based Arctic research projects funded by the National Science Foundation (NSF) since 1999. It also includes projects from other agencies (such as NOAA and NASA) that receive logistical support from NSF. Database fields include investigator name, project title, discipline, year, funding agency, a description, and more. The information is pulled from the Arctic Research Logistics Support Services (ARLSS) database, which is maintained by CH2M HILL Polar Services (CPS). Project records conform to an interagency project-tracking metadata standard developed in collaboration with the Alaska Data Integration Work Group (ADIwG). Comparable project-level web services might be available direct from other agencies or organizations shown in the ARMAP Viewer.

ARCGIS DESKTOP ARCGIS ONLINE WMS WFS ADIwG REST TXT

If you use ArcGIS Desktop, download this layer file: [public_Arctic_Field_Research_Projects.lyr](#). When added to ArcMap, it pulls from a service optimized for use in ArcMap documents that have the map projection set to North Pole Lambert

Home Partners About Interoperability Collaborate

ARCTIC OBSERVING VIEWER
collaborative mapping of data collection sites

For use in your own applications or databases, you may connect to AOV's suite of web services, which are data streams direct from AOV's servers. They can be opened in a variety of data management systems, GIS applications, and other software packages. They allow users and organizations quick access to comprehensive, remotely updated information.

These web services are considered an important contribution to the interagency US AON initiative as well as the international Sustaining Arctic Observing Networks (SAON) program, with the goal of promoting data interoperability and information exchange through as open services including Geoservices REST, OGC WMS/WFS, and as ISO 19115-3 metadata components.

Data Collection Sites

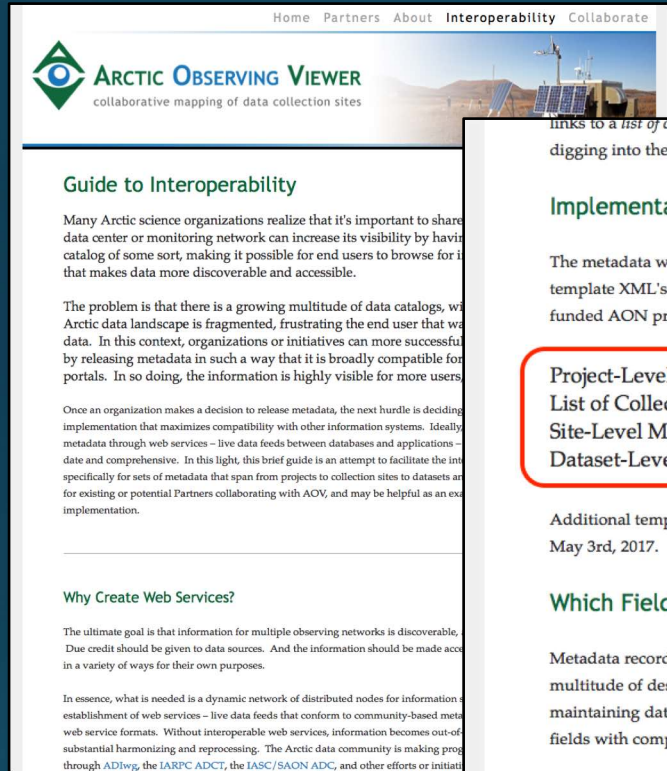
This web service contains information on data collection sites associated with long-term observing activities in the circumpolar. The information is actively compiled to enhance strategic planning and assessment for multiple observing networks. Data wrangling efforts have focused on sampling site information for projects funded by the US National Science Foundation's Arctic Observing Network (AON). Additional long-term observing activities funded or coordinated by other US entities and international networks are now included. Site records provide information on initiative, project name, funding agencies, discipline, contact information (name, email, phone, role), award number, program code, place, site name, site IDs, type of collection activity, location accuracy, start date, end date, scientific keywords plus links to archived information and project web links. For more information, see the [About](#) and [Interoperability](#) pages.

- + ArcGIS Desktop
- + ArcGIS Online
- + WMS
- + WFS

Field Research Project Locations, Data Collection Sites, Location Placenames, Arctic Base Map, Arctic Countries, Arctic World Cities

ISO 19115-1, ISO 19115-2, FGDC, TXT, WMS, WFS, KMZ, ArcGIS

Guide to Interoperability



links to a *list of collection sites*, which includes links to individual *site-level metadata records*. This is easier to follow by digging into the XML as provided in the next section.

Implementation Examples

The metadata web services inherent to AOV and ARMAP are illustrated with ISO XML links in the table below. The template XML's are embedded with explanatory text, whereas the use case XML's are from live services for an NSF-funded AON project. Together they can assist with generating a workflow.

Project-Level Metadata:	template XML	use case XML
List of Collection Sites:	template XML	use case XML
Site-Level Metadata:	template XML	use case XML
Dataset-Level Metadata:	-	use case XML

Additional templates will be made available when possible. The templates and use cases above were last updated on May 3rd, 2017.

Which Fields to Use?

Metadata records for projects, data collection sites, and scientific datasets have the potential for each to include a multitude of descriptive fields, or tags. It can be helpful to identify a minimum set of core fields while designing or maintaining databases and services. Indeed, most important for interoperability in general is the ability to "crosswalk" fields with compatible definitions. Existing and potential Partners are advised to peruse:

- the ISO XML templates above
- our contributors' template spreadsheet
- the AOV Database Data Dictionary

Annotated template ISO XML's, use case ISO XML's, contributors' template spreadsheet, data dictionaries, picklists ...

Journal Articles

ARCTIC
VOL. 68, SUPPL. 1 (2015) P. 100–110
<http://dx.doi.org/10.14430/arctic4877>

The U.S. Arctic Observing Viewer: A Web-Mapping Application for Enhancing Environmental Observation of the Changing Arctic

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ABSTRACT. Although much progress has been made with various Arctic Observing efforts, assessing that progress can be difficult. What data collection efforts are established or underway? Where? By whom? To help meet the strategic needs of programs such as the U.S. Study of Environmental Arctic Change (SEARCH), the Arctic Observing Network (AON), Sustaining Arctic Observing Networks (SAON), and related initiatives, an update has been released for the Arctic Observing Viewer (AOV; <http://ArcticObservingViewer.org>). This web mapping application and information system has begun to compile the who, what, where, and when for thousands of data collection sites (such as boreholes, ship tracks, buoys, towers, sampling stations, sensor networks, vegetation sites, stream gauges, and observatories) wherever marine, terrestrial, or atmospheric data are collected. Contributing partners for this collaborative resource include the U.S. NSF, ACADIS, ADIwg, AOOS, a2dc, AON, ARMAP, BAID, CAFF, IASOA, INTERACT, and others. While focusing on U.S. activities, the AOV welcomes information exchange with international groups for mutual benefit. Users can visualize, navigate, select, search, draw, print, and more. AOV is founded on principles of interoperability, with open metadata and web service standards, so that agencies and organizations can use AOV tools and services for their own purposes. In this way, AOV will reinforce and complement other distributed yet interoperable cyber-resources and will help science planners, funding agencies, researchers, data specialists, and others to assess status, identify overlap, fill gaps, optimize sampling design, refine network performance, clarify directions, access data, coordinate logistics, collaborate, and more in order to meet Arctic Observing goals.

Key words: Arctic research; Arctic Observing networks; GIS; web mapping application; science management; cyberinfrastructure

RÉSUMÉ. Malgré les progrès réalisés dans le cadre de nombreux efforts d'observation de l'Arctique, les progrès peuvent être difficiles à évaluer. Quelles initiatives de collecte de données sont en cours ou sont établies? À quel endroit? Et qui gère ces initiatives? Pour aider à répondre aux besoins stratégiques de programmes comme ceux de l'organisme américain Study of Environmental Arctic Change (SEARCH), du réseau Arctic Observing Network (AON), des réseaux Sustaining Arctic Observing Networks (SAON) et d'autres programmes connexes, on a procédé à la mise à jour de l'Arctic Observing Viewer (AOV; <http://ArcticObservingViewer.org>). Ce système d'information jumelé à une application de mappage sur le Web a amorcé la compilation des coordonnées et des renseignements se rapportant à des milliers de sites de collecte de données (comme les trous de forage, les trajets de navires, les bouées, les tours, les stations d'échantillonnage, les réseaux de capteurs, les sites de végétation, les fluviomètres et les observatoires) où des données marines, terrestres ou atmosphériques sont prélevées. Parmi les partenaires qui collaborent à cette ressource, notons U.S. NSF, ACADIS, ADIwg, AOOS, a2dc, AON, ARMAP, BAID, CAFF, IASOA, INTERACT et d'autres encore. Bien que l'AOV se concentre sur les activités américaines, il accepte l'échange d'information avec des groupes internationaux lorsqu'il existe des avantages mutuels. Les utilisateurs peuvent visualiser les données, naviguer dans le système, faire des sélections et des recherches, dessiner, imprimer et ainsi de suite. L'AOV fonctionne moyennant des principes d'interopérabilité, avec des métadonnées ouvertes et des normes de service sur le Web afin que les organismes et les organisations puissent utiliser les outils et les services de l'AOV pour leurs propres fins. De cette façon, l'AOV sera en mesure de consolider et de compléter d'autres cyberressources à la fois réparties et interopérables, en plus d'aider les planificateurs de la science, les bailleurs de fonds, les chercheurs, les spécialistes des données et d'autres encore à évaluer les statuts, à repérer les doublons, à combler les écarts, à optimiser les plans d'échantillonnage, à raffiner le

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Article

Metadata Life Cycles, Use Cases and Hierarchies

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Abstract. The historic view of metadata as “data about data” is expanding to include data about other items that must be created, used, and understood throughout the data and project life cycles. In this context, metadata might better be defined as the structured and standard part of documentation, and the metadata life cycle can be described as the metadata content that is required for documentation in each phase of the project and data life cycles. This incremental approach to metadata creation is similar to the spiral model used in software development. Each phase also has distinct users and specific questions to which they need answers. In many cases, the metadata life cycle involves hierarchies where latter phases have increased numbers of items. The relationships between metadata in different phases can be captured through structure in the metadata standard, or through conventions for identifiers. Metadata creation and management can be streamlined and simplified by re-using metadata across many records. Many of these ideas have been developed to various degrees in several Geoscience disciplines and are being used in metadata for documenting the integrated life cycle of environmental research in the Arctic, including projects, collection sites, and datasets.

Keywords: metadata; standards; life-cycle; use-cases; project metadata; metadata hierarchy; observations; measurements; XML

1. Introduction

The Data Life Cycle is a well-known, high-level description of the typical steps or phases in scientific projects. There are many descriptions of this life cycle that vary in detail, but Figure 1 shows a general framework that includes planning, data collection, analysis, archiving, sharing, and reuse. The first three phases of this life cycle are well-known in the scientific community, as scientists have been planning experiments and observational campaigns for centuries within the context of the scientific method [1]. The latter phases (sharing, archiving, and reuse) have received considerable attention during the last several decades, as data collection and processing become more complex and expensive, and many scientific problems require large, multi-disciplinary teams. Maximizing the value of data, both expected and unexpected, is increasingly important. In fact, many would agree that the path connecting Data Sharing to Data Archive and Re-Use should not go through the End of Project, as sharing metadata (and data) before a project is over is now considered a best practice in many discussions of open science.

[Manley et al. 2015 article in Arctic](#) about AOV, ARMAP, and interoperability

[Habermann 2018 article in Geosciences](#) about hierarchical and distributed metadata services, with a focus on ARMAP and AOV

For Science Planning

- Browse who's doing what where when
- See where and how research is concentrated
- Search, filter, or zoom in to see opportunities for coordination
- Find points of contact for collaboration
- Follow links to other resources
- Conduct "Strategic assessment"

Assess status. Coordinate Logistics.

Identify co-location of activities, large facilities, and resources.

Find overlap. Fill gaps. Clarify directions.

Use ...



for logistics bases

armap.org



for observing sites

arcticobservingviewer.org