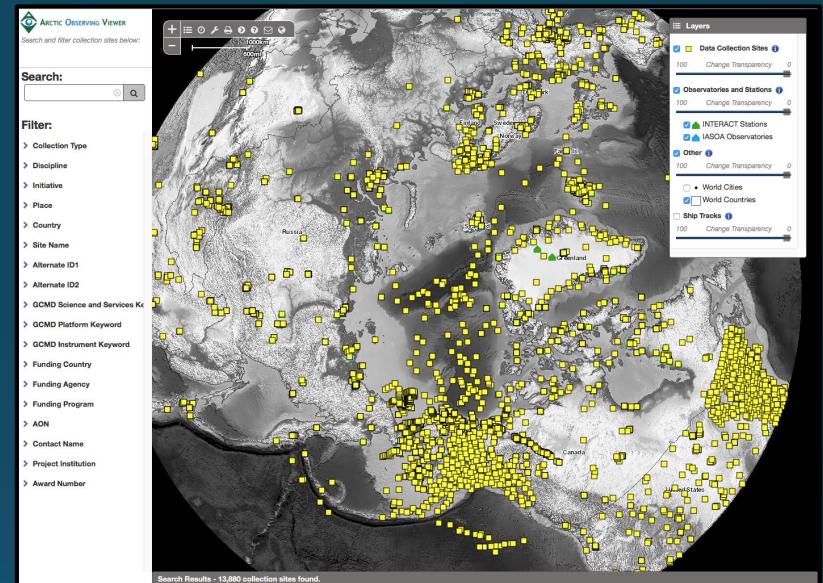
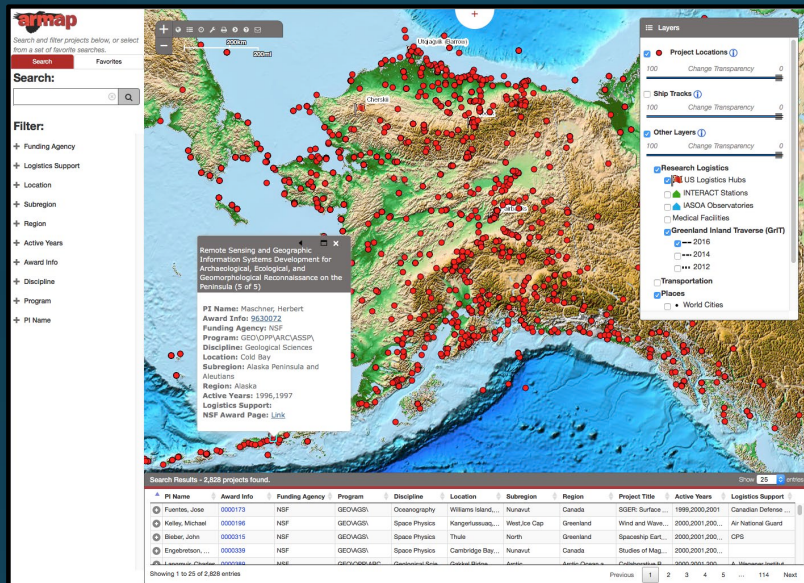


Apps for Arctic Science Planning: ARMAP & AOV



Polar Data and Systems Architecture Workshop
November 28, 2018

William Manley, Allison Gaylord, Craig Tweedie, Naomi Whitty



A Challenge ...

... is knowing who is doing what where.

What networks and assets already exist?

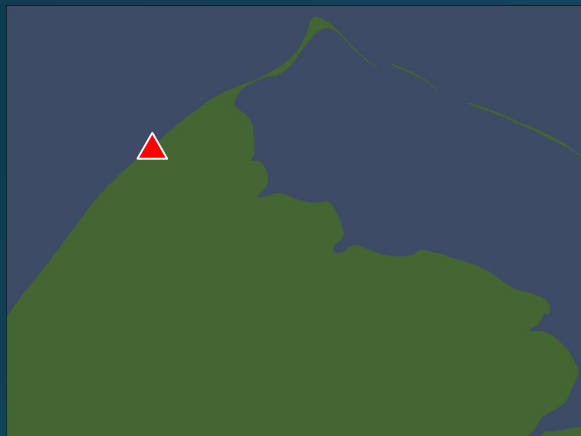
Where are the gaps?

Is there overlap?

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

Project - Data Life Cycle

Project Planning



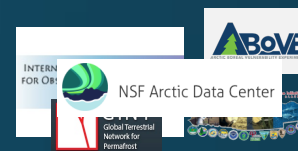
Each **project location** is a logistical base of operation.

Observations & Networks



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

Dataset Usage & Understanding



Each observing 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



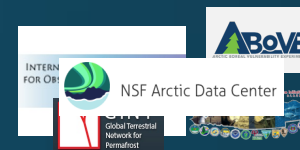
Where are existing data collection sites?

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
- 2700+ 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

Web Services

The screenshot shows the ARMAP website with a navigation bar including Home, Launch Viewer, Text Search, Map Gallery, Web Services (highlighted), About, and Resources. The main content area is titled 'Web Services' and contains a section 'Connect to web services for live, updated data & information.' This section explains that users can connect to ARMAP's suite of web services for data streams, GIS applications, and other software packages. It lists various services available, including Field Research Project Locations, Arctic Base Map, Arctic Countries, Arctic World Cities, and Map Projections. A 'Field Research Projects REST' section is also visible, highlighting the ADIwG REST service for Field Research Project Locations, which allows access to metadata records and customization of parameters for a permanent URL. A button labeled 'ARMAP REST PAGE' is present. Below this, the 'Field Research Project Locations' section is shown, featuring a map of the Arctic region with numerous red dots representing project locations. The text describes the data sources, including the National Science Foundation (NSF) and the Alaska Data Integration Work Group (ADIwG). At the bottom, there is a section for 'ARCGIS DESKTOP' with a link to download a layer file.

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 Projects REST

One of ARMAP's most requested features is the **ADIwG REST service for Field Research Project Locations**, which allows you to access metadata records and customize parameters for a permanent URL.

[ARMAP REST PAGE](#)

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

The screenshot shows the ARCTIC OBSERVING VIEWER website with a navigation bar including Home, Partners, About, Interoperability, and Collaborate. The main content area is titled 'ARCTIC OBSERVING VIEWER' with the tagline 'collaborative mapping of data collection sites'. It features a large image of a solar panel array in a snowy landscape. The text explains that users can connect to AOV's suite of web services for data streams, GIS applications, and other software packages. It lists various services available, including Geoservices REST, OGC WMS/WFS, and ISO 19115-3 metadata components. A 'Data Collection Sites' section is shown, featuring a map of the Arctic region with numerous yellow dots representing data collection sites. The text describes the data sources, including the US National Science Foundation's Arctic Observing Network (AON) and the Alaska Data Integration Work Group (ADIwG). At the bottom, there is a section for 'ARCGIS DESKTOP' with a link to download a layer file.

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 (ISAON) 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 region. 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](#)

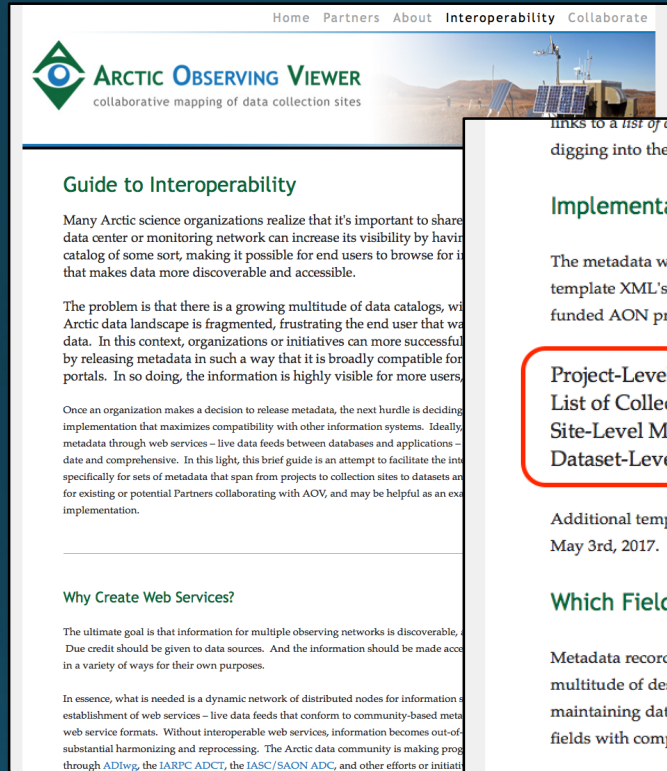
+ [WMS](#)

+ [WFS](#)

Field Research Project Locations, Observing 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

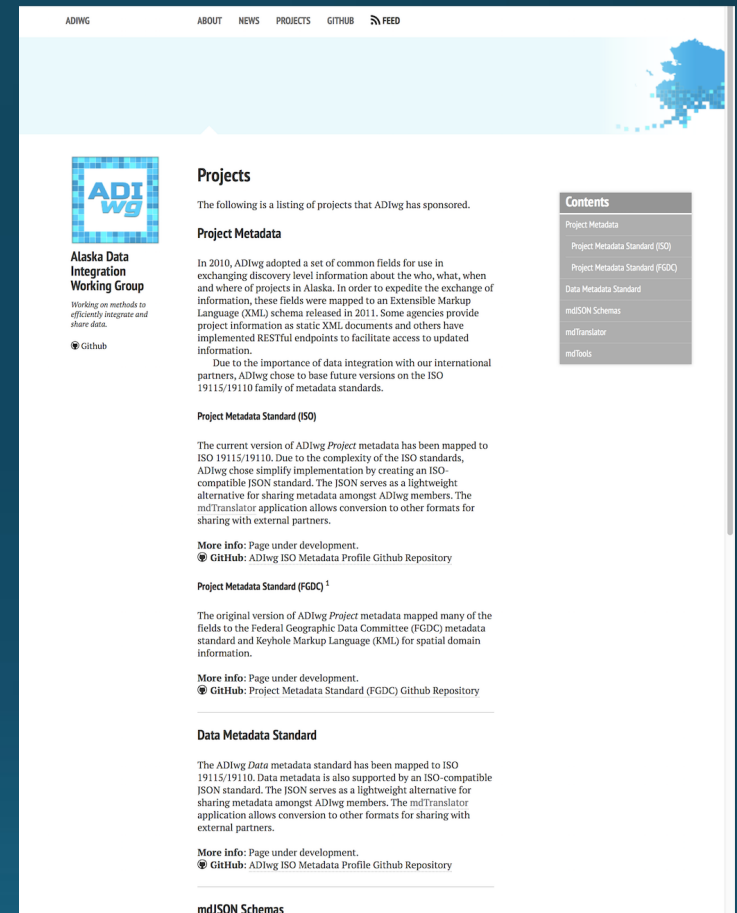
Annotated template ISO XML's, use case ISO XML's, contributors' template spreadsheet, data dictionaries, picklists ...

Alaska Data Integration Working Group (ADIIwg)

Working on methods to efficiently integrate and share data across US federal and state entities in Alaska.

- Project metadata standard (ISO, FGDC)
- Data metadata standard (ISO)
- mdJSON Schemas – for documentation and validation
- mdTranslator – for translation and conversion
- mdEditor -- web app for authoring
- mdTools – user friendly interface

and more, on GitHub.



The screenshot shows the ADIIwg website with a navigation bar (ABOUT, NEWS, PROJECTS, GITHUB, FEED) and a map of Alaska. The main content area is titled 'Projects' and lists sponsored projects. It includes sections for 'Project Metadata' and 'Data Metadata Standard', both of which are under development. A 'Contents' sidebar on the right lists the site's structure: Project Metadata, Project Metadata Standard (ISO), Project Metadata Standard (FGDC), Data Metadata Standard, mdJSON Schemas, mdTranslator, and mdTools.

Projects

The following is a listing of projects that ADIIwg has sponsored.

Project Metadata

In 2010, ADIIwg adopted a set of common fields for use in exchanging discovery level information about the who, what, when and where of projects in Alaska. In order to expedite the exchange of information, these fields were mapped to an Extensible Markup Language (XML) schema released in 2011. Some agencies provide project information as static XML documents and others have implemented RESTful endpoints to facilitate access to updated information.

Due to the importance of data integration with our international partners, ADIIwg chose to base future versions on the ISO 19115/19110 family of metadata standards.

Project Metadata Standard (ISO)

The current version of ADIIwg Project metadata has been mapped to ISO 19115/19110. Due to the complexity of the ISO standards, ADIIwg chose simply implementation by creating an ISO-compatible JSON standard. The JSON serves as a lightweight alternative for sharing metadata amongst ADIIwg members. The mdTranslator application allows conversion to other formats for sharing with external partners.

More info: Page under development.
GitHub: ADIIwg ISO Metadata Profile Github Repository

Project Metadata Standard (FGDC)

The original version of ADIIwg Project metadata mapped many of the fields to the Federal Geographic Data Committee (FGDC) metadata standard and Keyhole Markup Language (KML) for spatial domain information.

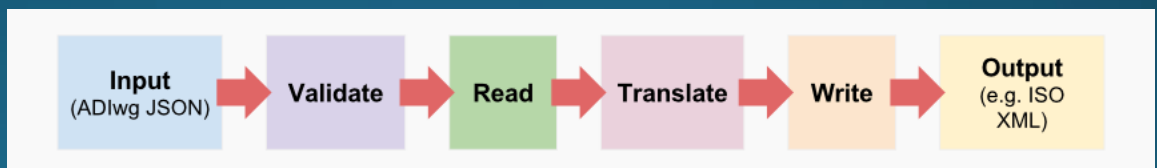
More info: Page under development.
GitHub: Project Metadata Standard (FGDC) Github Repository

Data Metadata Standard

The ADIIwg Data metadata standard has been mapped to ISO 19115/19110. Data metadata is also supported by an ISO-compatible JSON standard. The JSON serves as a lightweight alternative for sharing metadata amongst ADIIwg members. The mdTranslator application allows conversion to other formats for sharing with external partners.

More info: Page under development.
GitHub: ADIIwg ISO Metadata Profile Github Repository

mdJSON Schemas



Interoperability

Goal: to easily find, assess, access, reuse, and integrate data and metadata

Challenges: for project-level and site-level metadata, a fragmented data landscape & incompatible conceptual models, metadata structures, and vocabularies

Solutions?

- **Share** schemas, templates, data dictionaries, code lists, use cases, crosswalks, transforms, web services, ...
- Groups starting out: proceed with **eyes wide open** to avoid later effort
- Enable **federated search**
- **Avoid silos**: Arctic, Antarctic, disciplinary, organizational, etc.
- **Communicate and coordinate**: ADC, IARPC, SCADM, SOOS, RDA, etc.

Specific Suggestions

- Standardize vocabularies for **observation/measurement type** (controlled vocabulary for essential variables)
- **Include full project-level and site-level metadata** inside dataset-level metadata records

Thank you

William Manley, Allison Gaylord, Craig Tweedie, Naomi Whitty



armap.org



arcticobservingviewer.org