EXPEDITION: An integrated approach to expose expedition information and research results

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Summary. The portal EXPEDITION offers an integrative "one-stop-shop" framework for discovery and re-use of scientific content originating from research platforms operated by the Alfred Wegener Institute (AWI). This information sharing framework is designed for interoperability and can be extended to various information systems worldwide. The framework is based on open technologies and access is freely available for scientists, funding agencies and the public. Because AWI's research is known to be focused on both Polar Regions, access to various ready-to-use data products from the Arctic Ocean, the Southern Ocean and Antarctic as well as AWI-operated observing networks will be offered.

Keywords. data management, data sharing, information integration

1. Introduction

The first data and publication discovery services offered by Alfred Wegener Institute with focus on Polar Regions dates back about 10 years [1]. With the recently re-factored EXPEDITION portal [2, 3], a data access framework based on international standards, as defined by the International Standards Organization (ISO) and Open Geospatial Consortium (OGC) and supporting interoperability with various international initiatives (e.g., SeaDataNet II, EUROFLEET II, etc.) has been launched.

As depicted in Figure 1, EXPEDITION integrates content from distinct research platforms (vessels, ocean-based stations, land-based stations and aircraft) into one portal. Map-supported browse, facetted search and interactive relationship graphs are some of the current functionality offered to support efficient content discovery.

The EXPEDITION framework is based on three core components:

- Expedition Catalogue – it contains metadata describing each AWI research platform and respective expeditions.
- DSHIP – the underway data acquisition system on board of e.g. Polarstern provides access to raw data from vessel-mounted devices and event logging (station book).
- Generalized track lines – used to display map-based validated routes as well as overlays with geo-referenced data.

2. Information discovery and access

In addition to the core components, EXPEDITION offers comprehensive discovery and access to various information systems containing expedition-related results and products. While to date the main information providers are PANGAEA (validated primary data) and EPIC (reports and publications), extensions to other providers are possible (e.g., access to AWI bathymetry database is planned).

A number of interoperability and core services have been developed in order to facilitate content discovery and access.

- Common vocabularies and Gazetteers – SeaDataNet vocabularies for describing ship operation status and activity, topic / theme / discipline and ocean regions (Gazetteer) are used in the metadata catalogue and in the discovery services.
- Near real-time data (NRT) – raw (non-validated) data from meteorological station and thermosalinograph on board of AWI vessels as well as 24-hour sea ice coverage images are graphically displayed in the portal homepage.

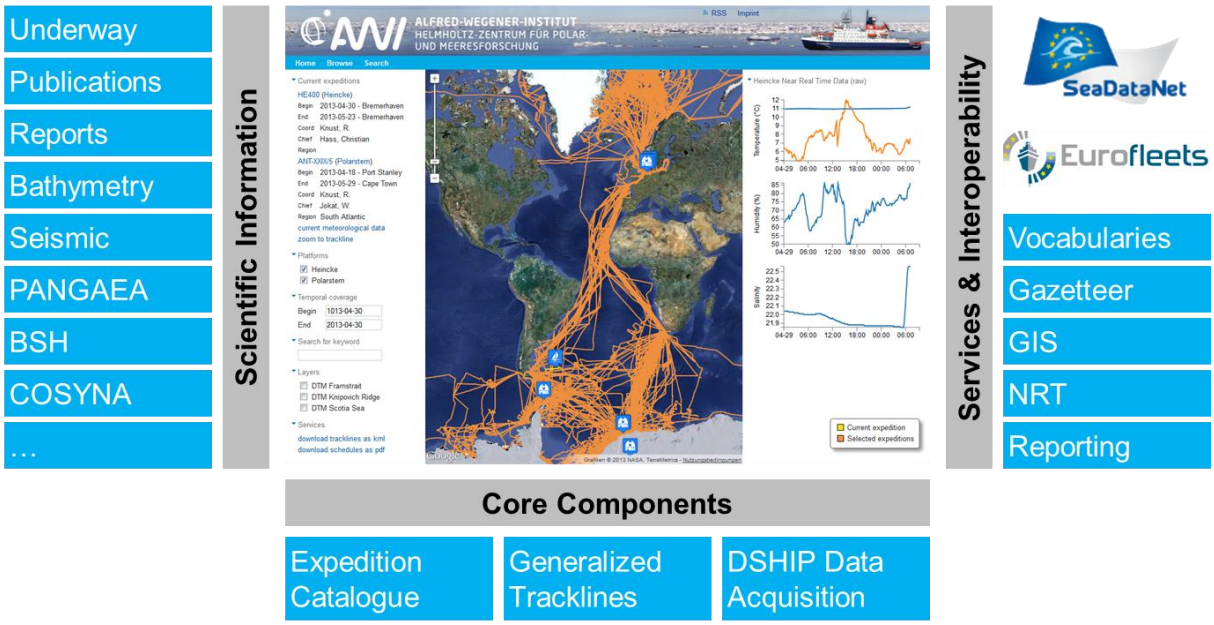

Figure 1. EXPEDITION architectural elements. Scientific information (left) is harvested from various sources and integrated via core components (bottom). Additional services and interoperability issues are embedded (right).

3. Future Work

We are currently extending our EXPEDITION catalogue so as to fulfill concrete requirements from AWI's Directorate and platform coordination. These are, among others, the need to track scientific output associated with various measurements on board and map-support to track line planning of future cruises in order to optimize resources. For example new tracks should be placed in areas where the vessels have not been yet or over old tracks so as to be able to search for trends or extend knowledge about a specific region.

In addition, EXPEDITION will soon offer semi-automatic generation of SeaDataNet Cruise Summary Reports. Discipline-oriented collections of GIS-based map layers are also planned (e.g., ready-to-use data products in PANGAEA like gridded sea ice concentration).

We are also planning to address the complex issue of accessing and visualizing big data for which unrestricted access is not practicable (e.g., bathymetry, multi-channel seismic). As proof-of-concept, we plan to use the existing multibeam bathymetry database as provider for EXPEDITION. Other big data candidates are audio and video material from AWI land-based and ocean-based stations.

4. Conclusions

The new EXPEDITION portal offers a "one-stop-shop" framework for discovery and access of scientific content related to AWI research platforms, in particular the ones in Polar Regions. A similar open-access framework designed for interoperability could be extended to other information systems worldwide which would help bringing together scientific content from Polar Regions.

Given that a wide range of statistics could additionally be generated using the harvested information. So monitoring and reporting of publications and data resulting from research programmes – institutional or global, such as IPY – can be implemented straightforwardly.

References

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