Mapping Arctic Observing Systems and In Situ Data Collections

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Abstract.

There is a great need for better information on the state and changes in the Arctic marine environment. Climate change in the Arctic is significant and will have far-reaching consequences for marine life and sustainable industrial development in the Arctic. It produces a lot of data from polar field satellites, but these are limited to the surface of sea, land and ice. Direct measurements (in situ) of the marine environment in Arctic waters are absolutely necessary to estimate the state and changes in the marine environment. Since collecting in situ data in polar regions most often funded by research projects, much of the data becomes time-limited and without a general plan. The H2020 INTAROS project has conducted a survey of Arctic in situ observing systems, in situ and remote sensing data collections (M. Tjernstrøm et al., 2019). Based on the questionnaires from this survey we have developed a user friendly web-based system for collecting and maintaining information about in situ observing systems and data collections in a project funded by the Norwegian Ministry of Climate and Environment. This system, ARCMAP, will be used to maintain and extend the INTAROS survey of Arctic observation systems and data collections, as a contribution to GEO and SAON.

The arcmap survey application.

ARCMAP is a web application for collecting and updating information about in situ observation systems. It allows the user to create and edit detailed descriptions of observation systems that are, have been or will be deployed to measure various environmental parameters in the Arctic. This information on observation systems is organized in a database, enabling easy retrieval and updating, and facilitating analysis of the capacity for environmental monitoring in a given area and time period.

The application is developed at NERSC using open source frameworks for web applications, including Python Django 2 and the wq.io online survey framework, and packaging the application in a Docker container that is deployed on a server at the Center. We have extended the wq.io framework to provide the needed functionality for ARCMAP, among others, allowing multiple types of geographic objects to represent the location and extent of an observation system composed of several subsystems. The survey is now presented as a series of forms that can be created and updated separately. This allows users to complete the system description in multiple sessions, and only reopen those parts that need updating when there is new information about their systems (Figure 1).

Extraction of indicators and statistics from the ARCMAP database

ARCMAP stores the survey results in a relational database. The collected system description can be easily retrieved and combined to extract information about, among others, which parameters are being measured in different regions and time periods, where collected data are stored, and which application areas the systems are designed to serve (Figure 1). The extracted information is then presented using the Matplotlib open source plotting library.

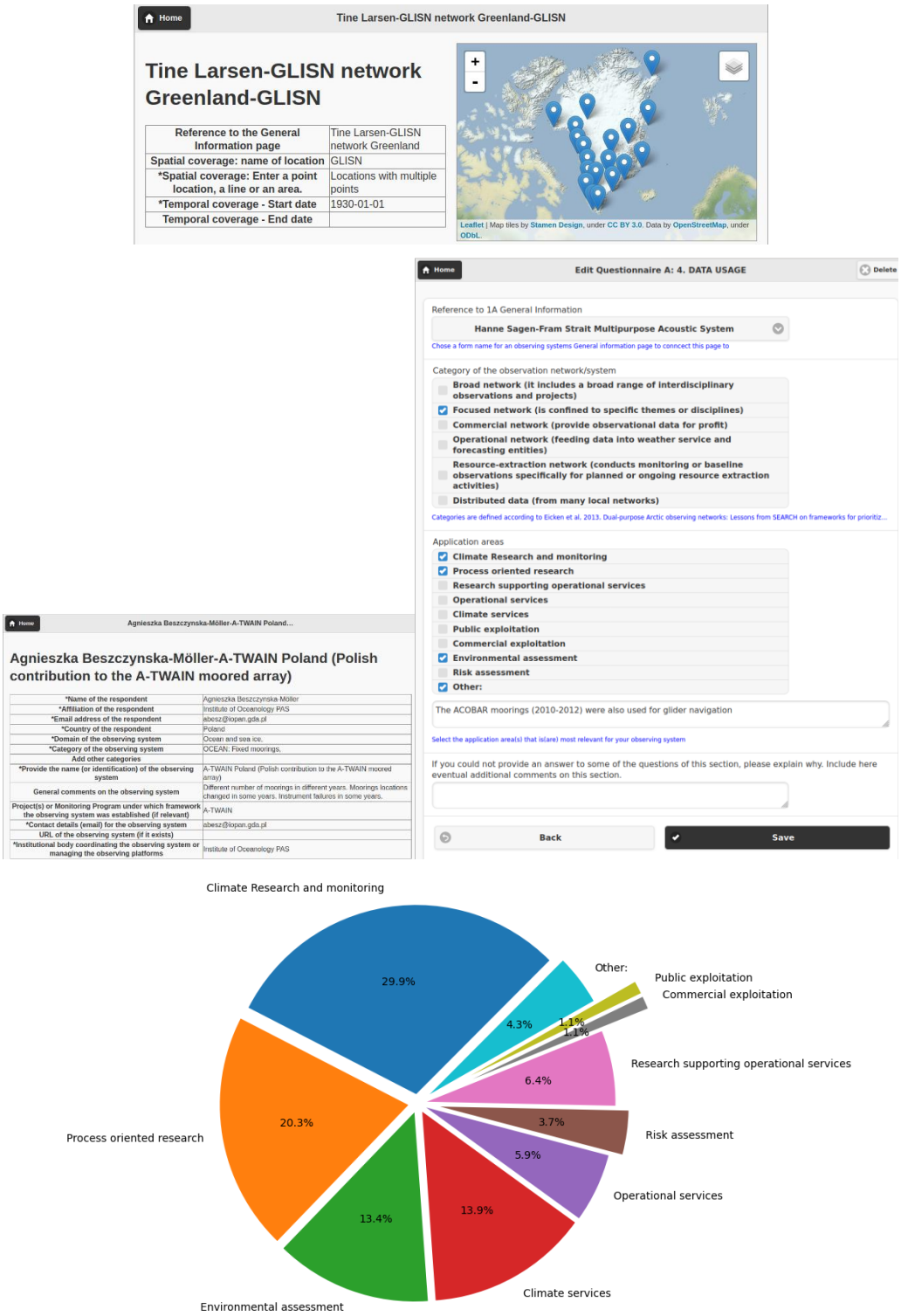

Figure 1: Selected screen shots from ARCMAP. Upper: Locations of land based stations in an environmental monitoring network for glaciers on Greenland. Middle: Example of general information about an observation system and the input form for updating this part of the survey. Lower: Application areas served by the surveyed observation systems.

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References: Tjernstrøm, Michael; et al. 2019. Deliverable 2.10. Synthesis of gap analysis and exploitation of the existing Arctic observing systems. INTAROS project 2019. https://intaros.nersc.no/sites/intaros.nersc.no/files/D2.10_INTAROS_Synthesis_v9.0.pdf