INTAROS: Integrated Arctic Observation System

Coordinator: Stein Sandven, Nansen Environmental and Remote Sensing Center

- The main objective is to develop, improve and extend Arctic observing systems for atmosphere, ocean, cryosphere, terrestrial sciences and local communities with focus on in situ systems
- More than 300 scientists from 49 organisations in 20 countries have been involved in the project

INTAROS

www.intaros.eu, https://intaros.nersc.no

INTAROS receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727890

INTAROS data collection 2017-2021

Temperature profiles of the soil to observe thaw depth in Alaska sites (USFD and Univ. Exeter)

Observations of atmospheric C02 and CH4 in Siberia (MPG)

Oceanographic, sea ice and snow measurements in central Arctic from automated ice buoys (FMI, PRIC, NMEFC, NERSC and IOPAN)

Meteorological, snow and soil data from 4 location in Eastern Canadian Arctic (CNRS Takuvik)

Atmospheric profiles and surface measurements in the central Arctic from ODEN (MISU)

Oceanographic and ecosystem data from bio-Argo floats in Baffin Bay (CNRS Takuvik)

MOSAiC Expedition 2019-2020 (FMI)

PROMICE weather station data from Greenland Ice Sheet (GEUS)

Oceanographic, biogeochemical, and sea ice measurements on moorings north of Svalbard (NERSC, UIB, IOPAN and LOCEAN)

Oceanographical data from moorings in Young Sound and ship-borne sections (AU)

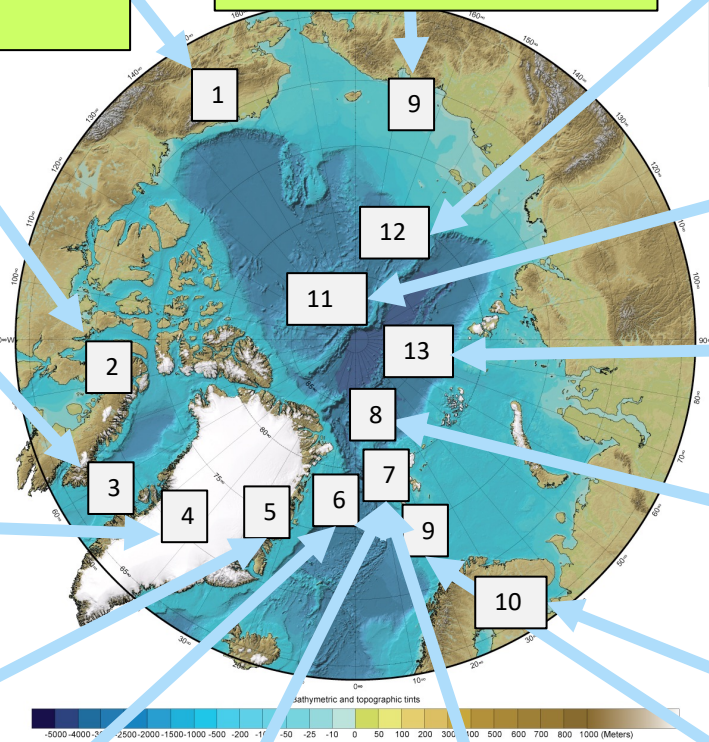
Soil temperature and snow measurements from stations in northern Finland (FMI)

HAUSGARTEN & arcFOCE (AWI) and seismic (UIB) observations in Fram Strait

Biogeochemical (LOV) and acoustical (UIEM) observations in Kongsfjorden

Glaciers fronts and Use GPR in Svalbard (U Slaski, UPM)

Research school on KV Svalbard in Storfjorden (NERSC)



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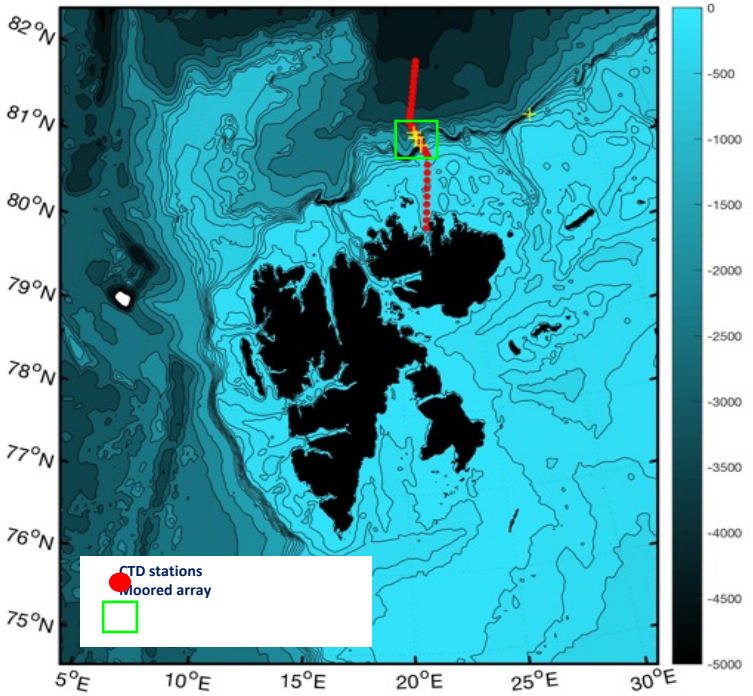
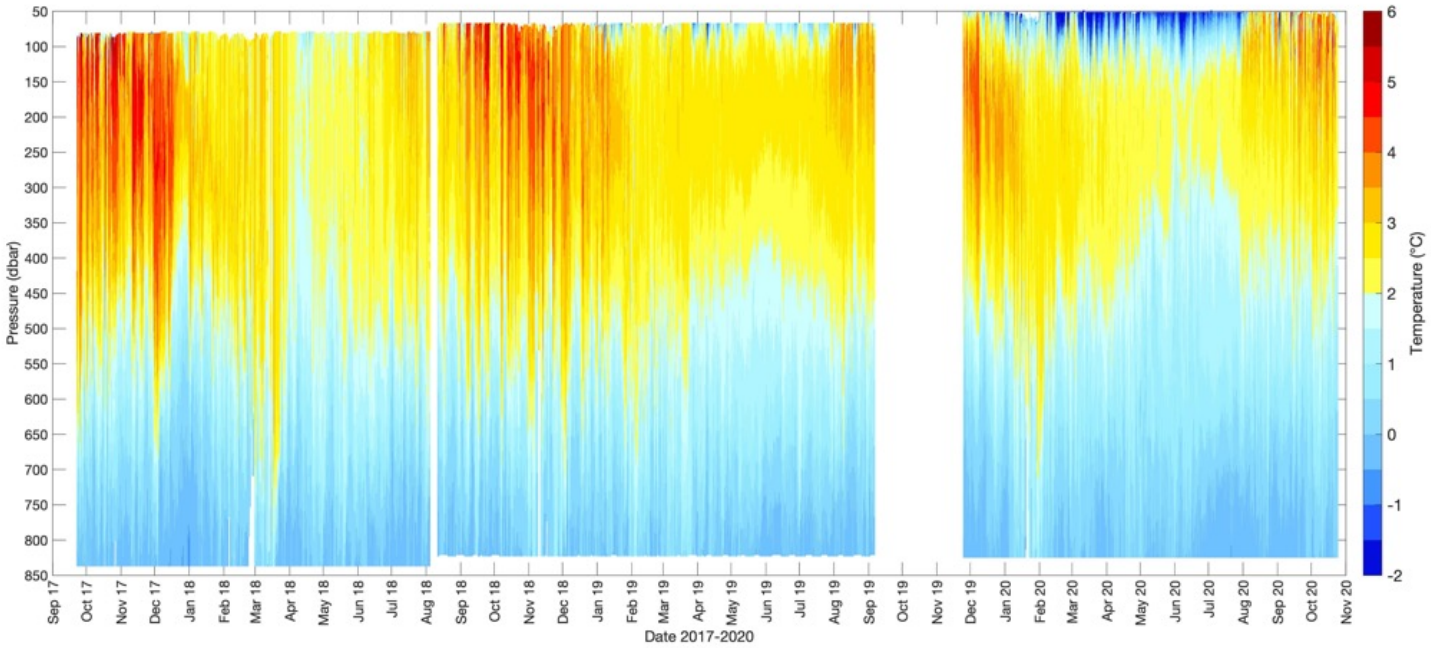
Oceanographic moorings north of Svalbard





Time series ocean temperature from 2017-2020 from a McLane profiler

Lead: Agnieszka Beszczynska-Möller, IOPAN

Objective: Monitor the inflow of Atlantic water into the Arctic Ocean in the key area where strong ocean-atmosphere-sea ice interactions result in significant heat loss and water mass transformation
Data are accessible at eCUDO (IOPAN data base) and SEANOE data repository (LOCEAN data).

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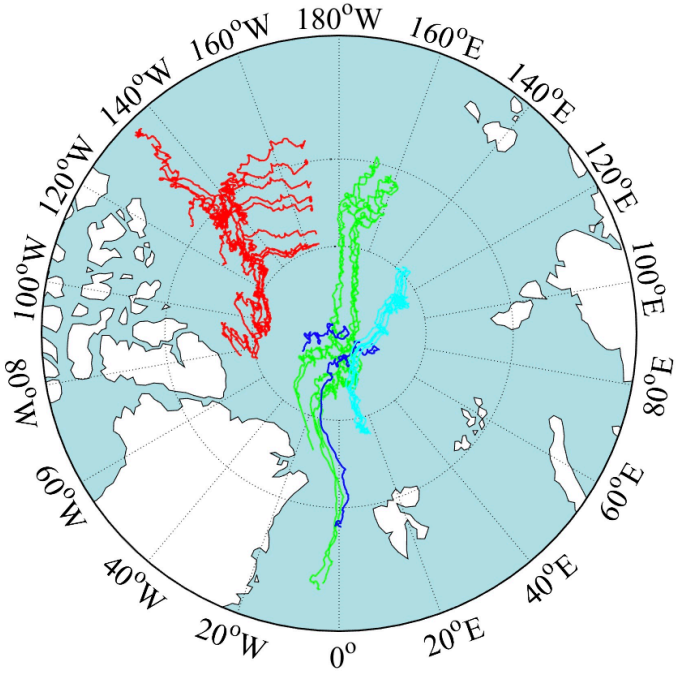
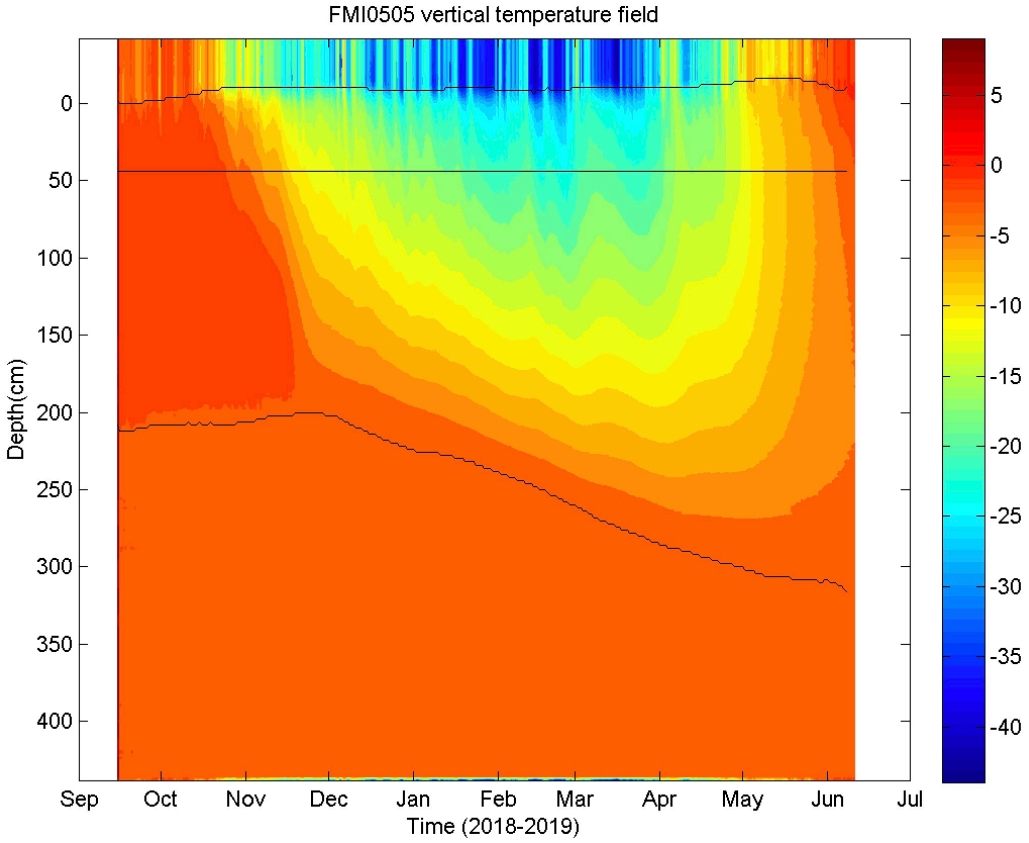
Network of Snow and Ice Mass Balance buoys in the Arctic



Trajectories of SIMBA buoys deployed in the Arctic in the period 2018-2020



Deployment of a SIMBA buoy

Lead: Bin Cheng, FMI

The objective of the SIMBA ice mass balance buoys is to measures high-resolution (2cm) vertical temperature profiles (4 times a day) through the air-snow-sea ice-ocean column.

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Polar Research Institute of China
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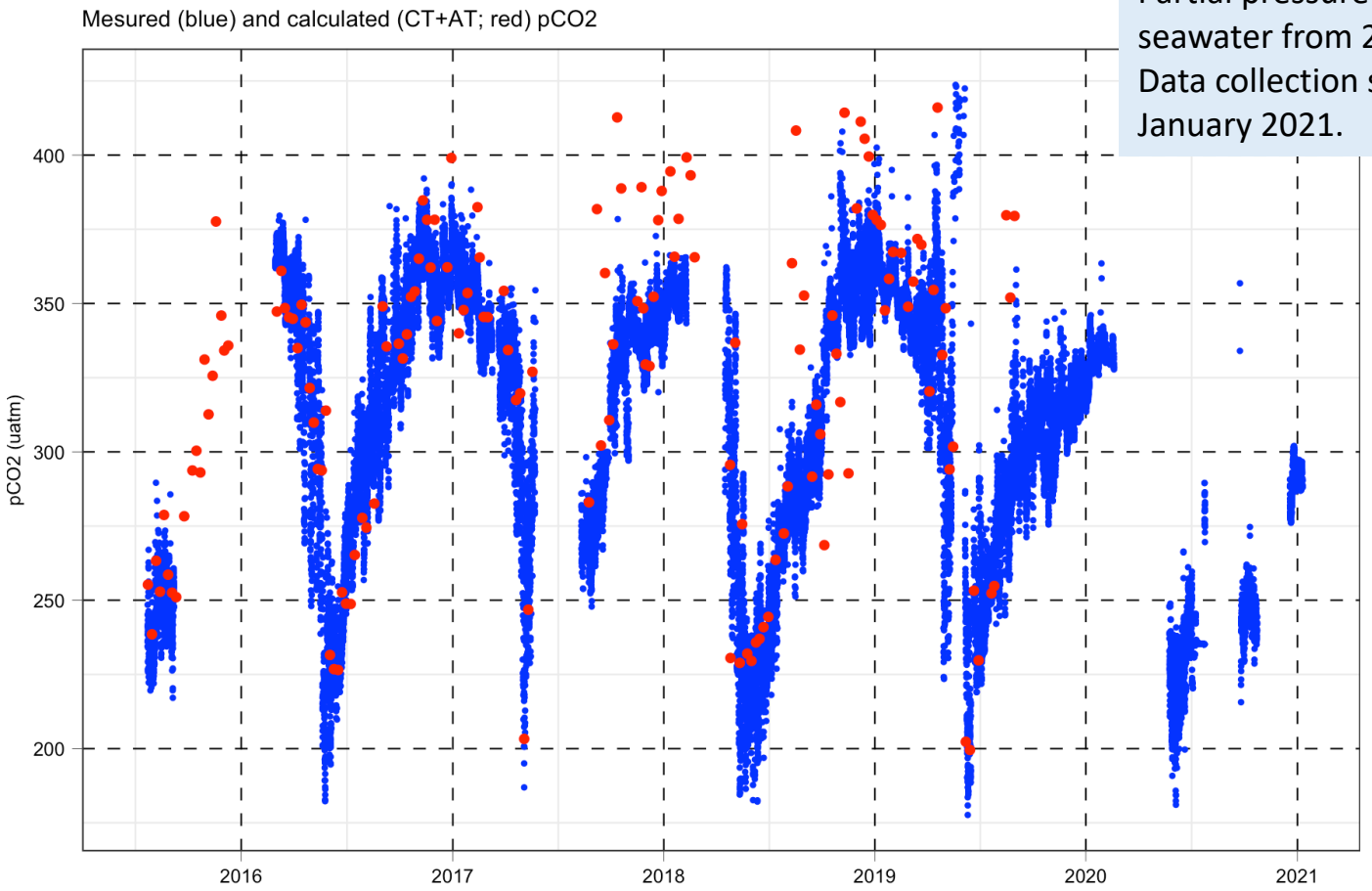
NMEFC

High-frequency measurement of CO2 in Kongsfjorden



Partial pressure of CO2 in seawater from 2015-2021. Data collection stopped in January 2021.

The objective is to expand and continue the only high-frequency time-series of parameters of the carbonate chemistry system to document ocean acidification and air-sea CO2 fluxes at the AWIPEV observatory.

Lead: Jean-Pierre Gatuso, LOV/CNRS

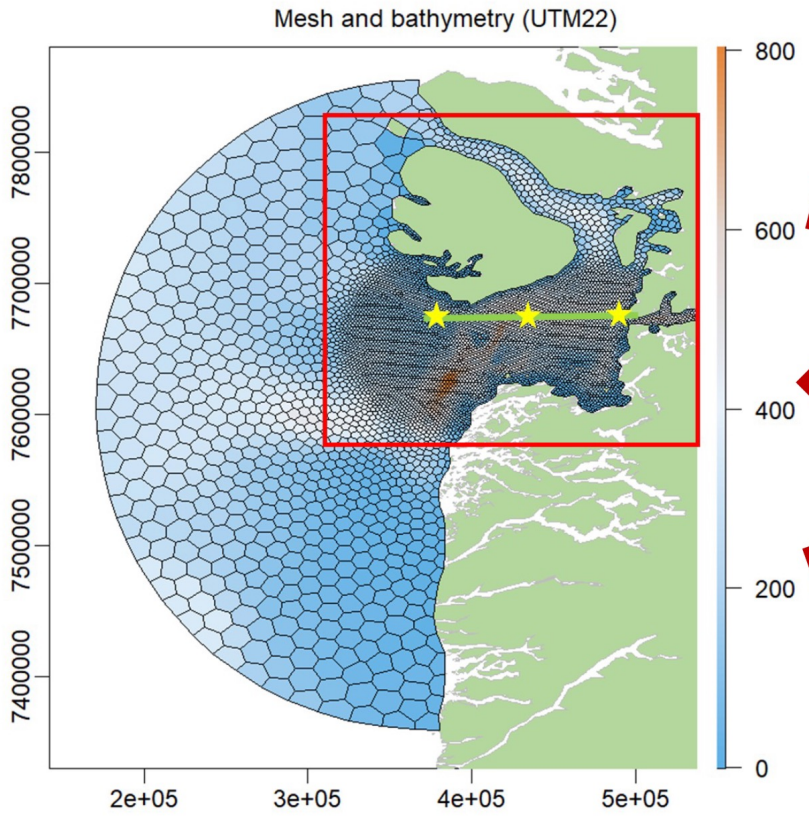
Ecosystem model for Disko Bay (FlexSem – ERGOM)

Integrates and utilizes a broad range of model output and observations

Sea ice model (CICE, DMI)

Large scale hydrodynamic ocean model (HYCOM, DMI)

Large scale ecosystem model (ERSEM, NIVA)



Greenland IS discharge (PROMICE, GEUS)

Satellite data assimilation (DTU)

In situ data integration (Greenland monitoring program, AU)

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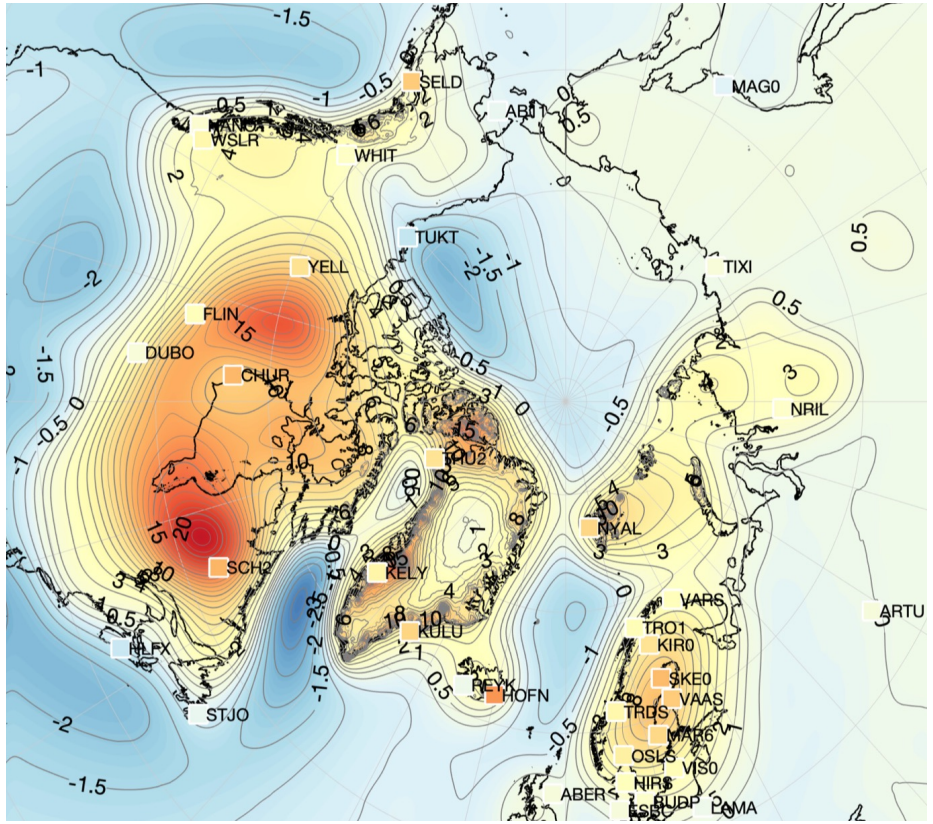
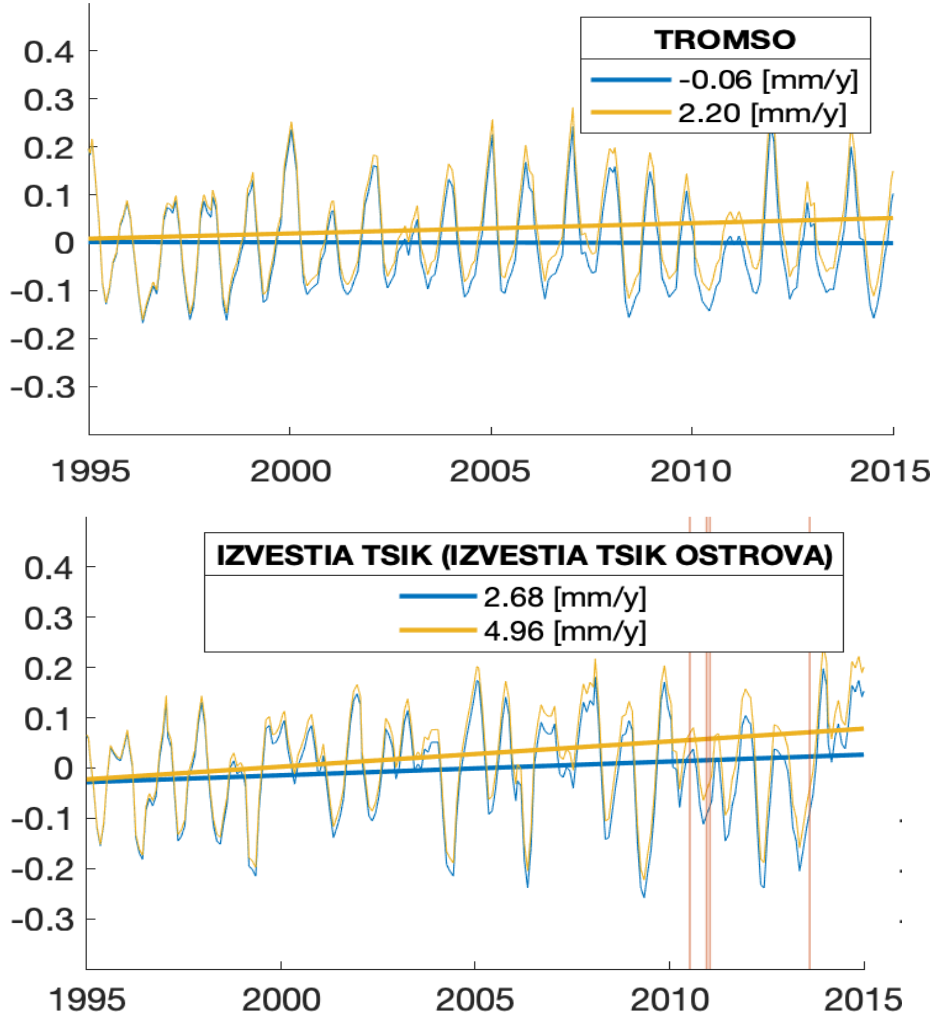
AARHUS UNIVERSITY
DEPARTMENT OF BIOSCIENCE

Lead: Mikael Sejr, Aarhus University

Arctic Tide Gauge observed sea level and Vertical Land Motion



Vertical velocity for modelled VLM and GNSS [mm/yr]



Tide Gauge Observed relative sea level (blue) and VLM-corrected sea level (yellow) at 2 selected stations (in meter). Red bars indicate missing data.

Lead: Carsten B. Ludwigsen, DTU

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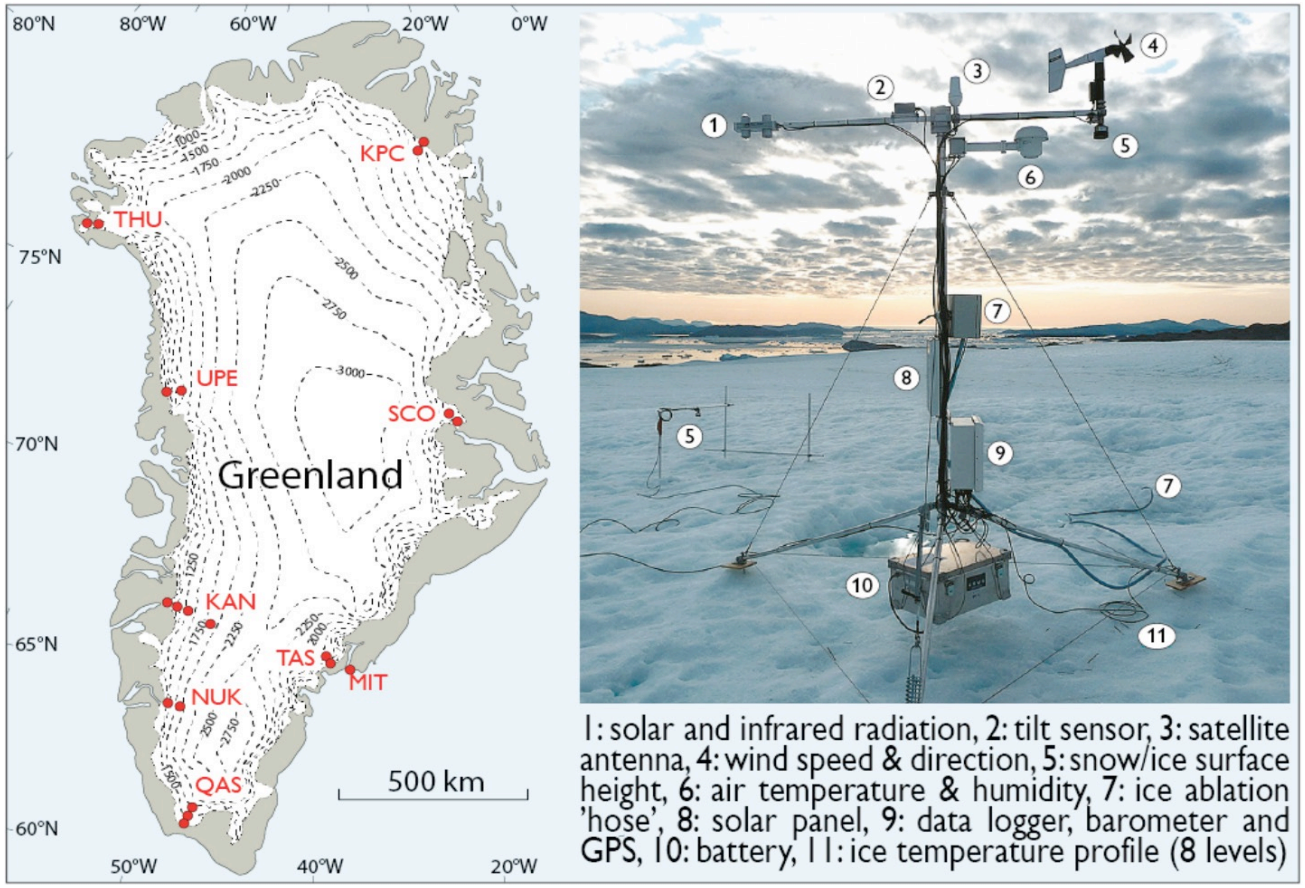
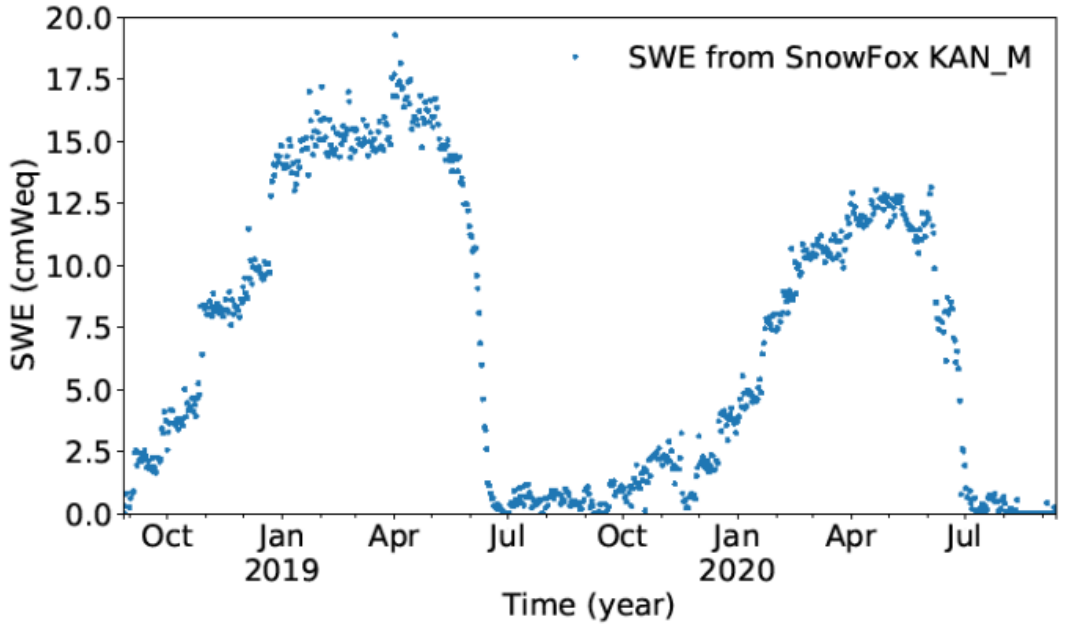
DTU Space
National Space Institute

Network of automatic weather station on the Greenland Ice Sheet





Example of Snow Water Equivalent (SWE) data from the new Snowfox instrument. Data access: https://doi.org/10.22008/promice/data/aws

The automatic weather stations (AWS) provide accurate measurements of the surface and near-surface atmospheric conditions Lead: Andreas Ahlström, GEUS

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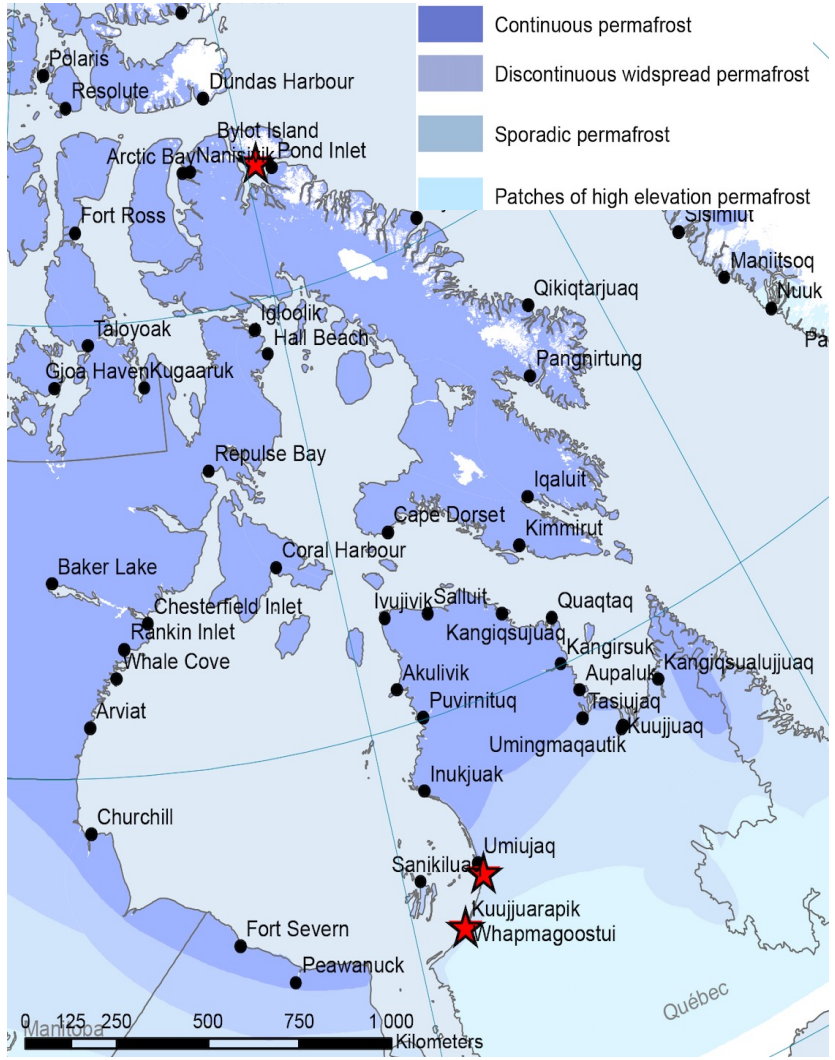
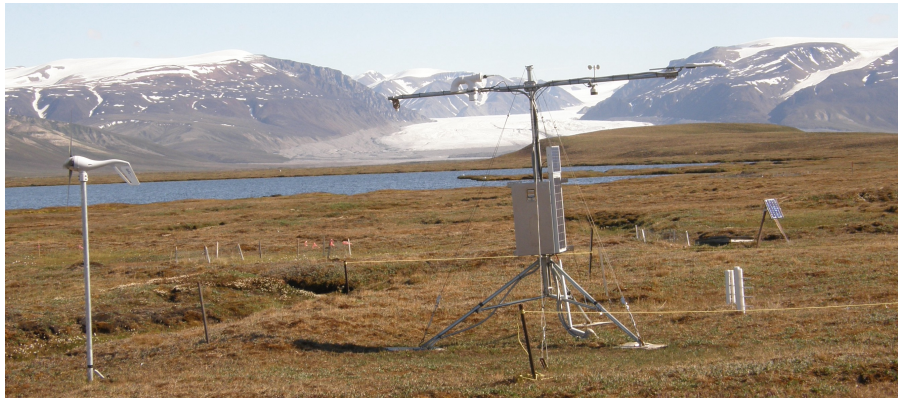
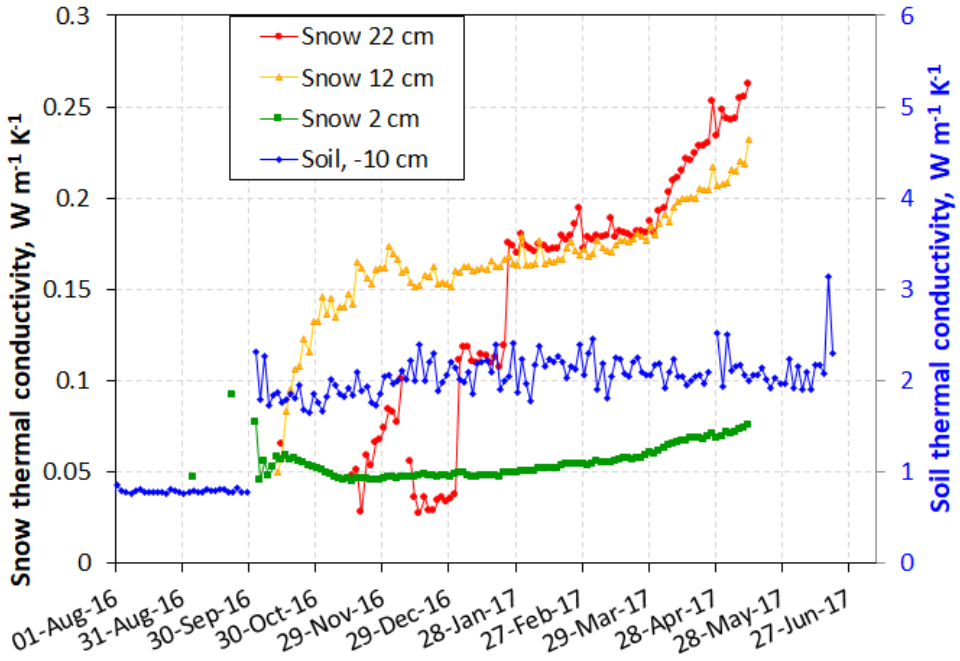
GEUS

PROMICE
Programme for Monitoring of the Greenland Ice Sheet

Snow, permafrost and atmospheric observations in Canadian Arctic







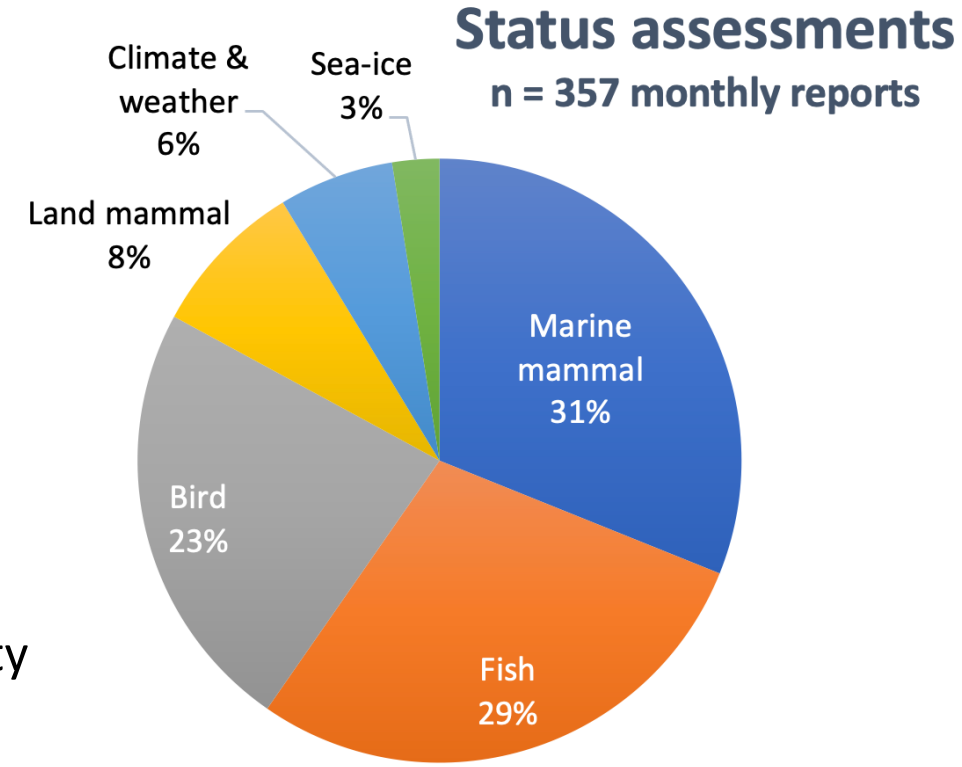
Arctic permafrost is thawing, with the potential of releasing large amounts of CO_2 and CH_4 from the decomposition of frozen organic matter. Monitoring of snow, permafrost and atmosphere are used to understand processes and detect feedbacks.

Data are stored in the Nordicana D repository: www.cen.ulaval.ca/nordicanad/

INTAROS TAKUVIK UNIVERSITÉ LAVAL cnrs

Lead: Marcel Babin, University of Laval/CNRS Takuvik

Community-observations of natural resources in North-West Greenland



The Qeqertalik Municipality and NORDECO are developing community observing in North West Greenland. The observations and reporting are done by typically fishermen and hunters in their respective communities. The work contributes to the Greenland Government's community observing network PISUNA (www.pisuna.org).

Marine mammal	111
Fish	102
Bird	83
Land mammal	30
Climate & weather	22
Sea-ice	9

Lead: Finn Danielsen, NORDECO

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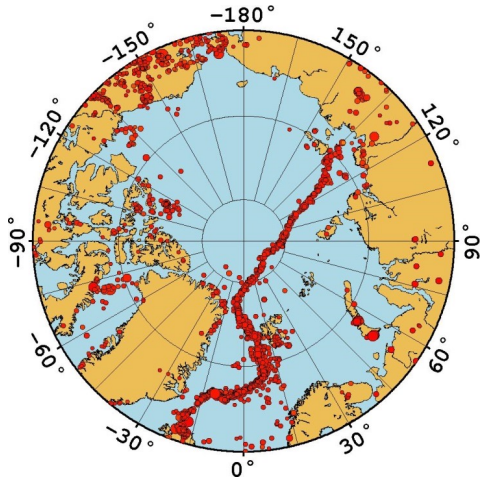
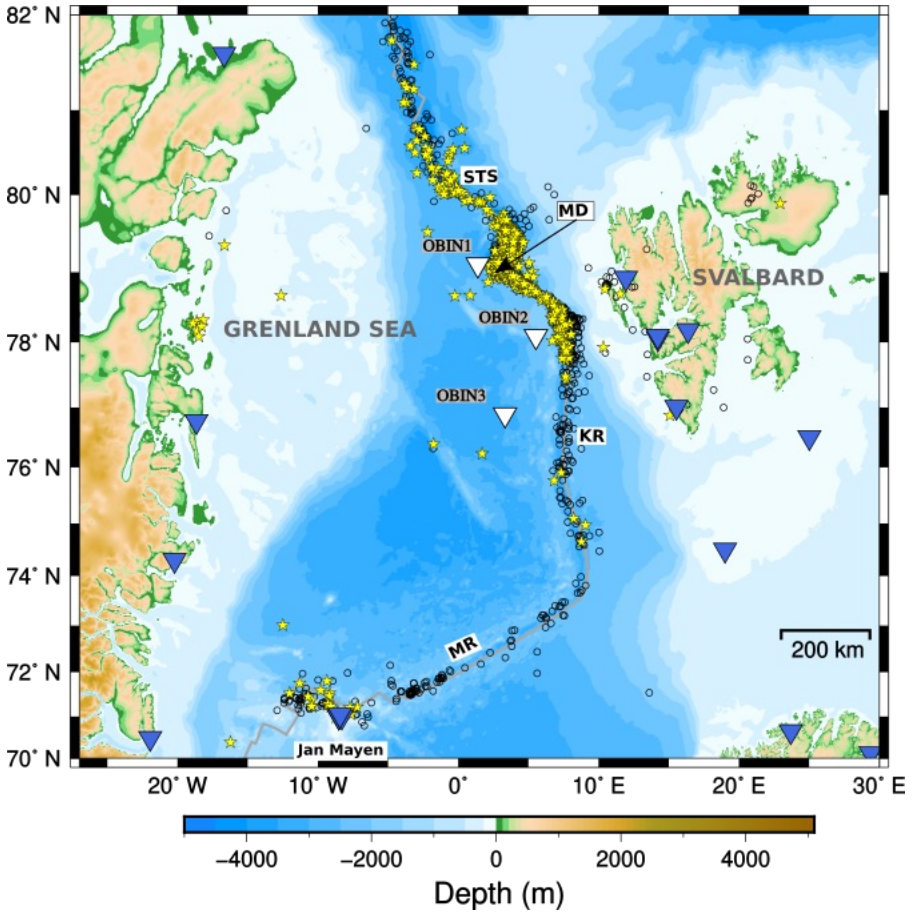
Kommune Qeqertalik

NORDECO
Nordic Agency for Development and Ecology

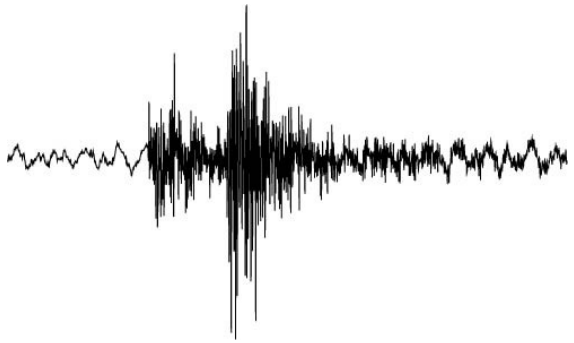
Geohazards in the Arctic: earthquakes as example



OBS deployments:
Ocean Bottom Seismometers



Citizen Science seismometers
in Greenland



Lead: Mathilde B. Sørensen, UiB
and Peter Voss, GEUS

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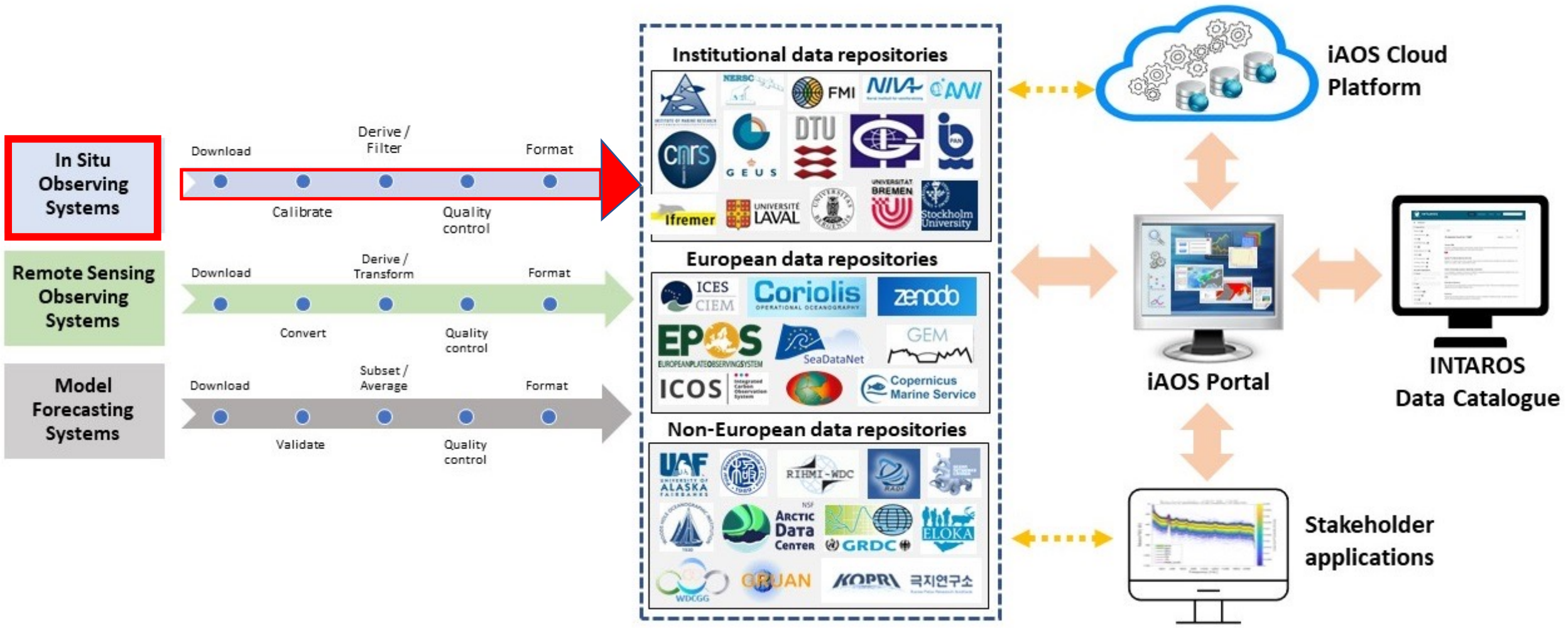
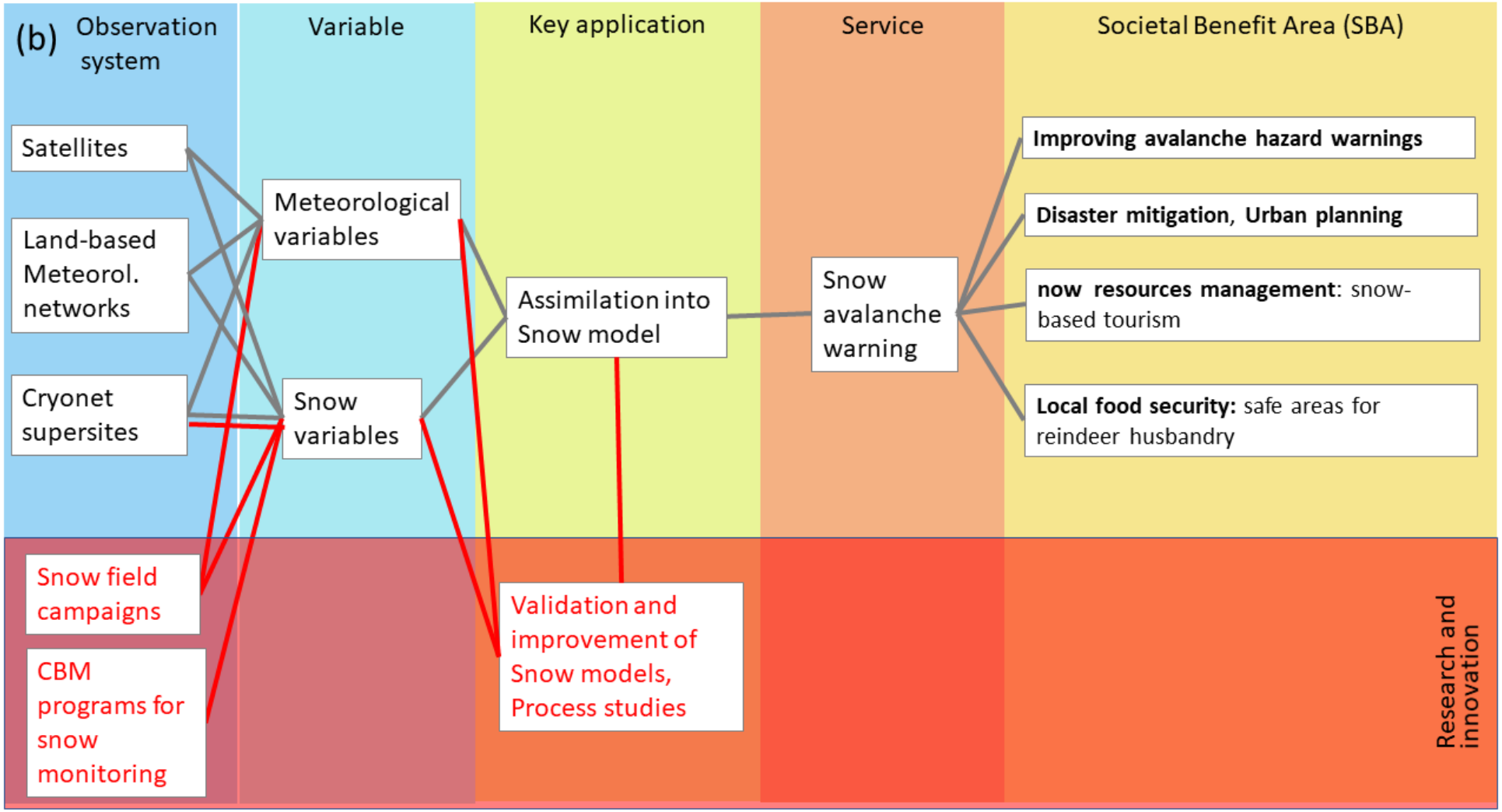
Data value chain and sub-systems



Data value chains for exploitation of data in various subsystems

From observing system to Societal Benefit Area
Example: Snow avalance warning



Ref. R. Pirazzini, INTAROS Roadmap 2022

https://portal-intaros.nersc.no/

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INTAROS data catalog

https://catalog-intaros.nersc.no/

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Datasets Organizations Topics About Search

Search data

E.g. environment

Popular tags: ocean temperature | CBM | ocean salinity

INTAROS Data Catalogue statistics

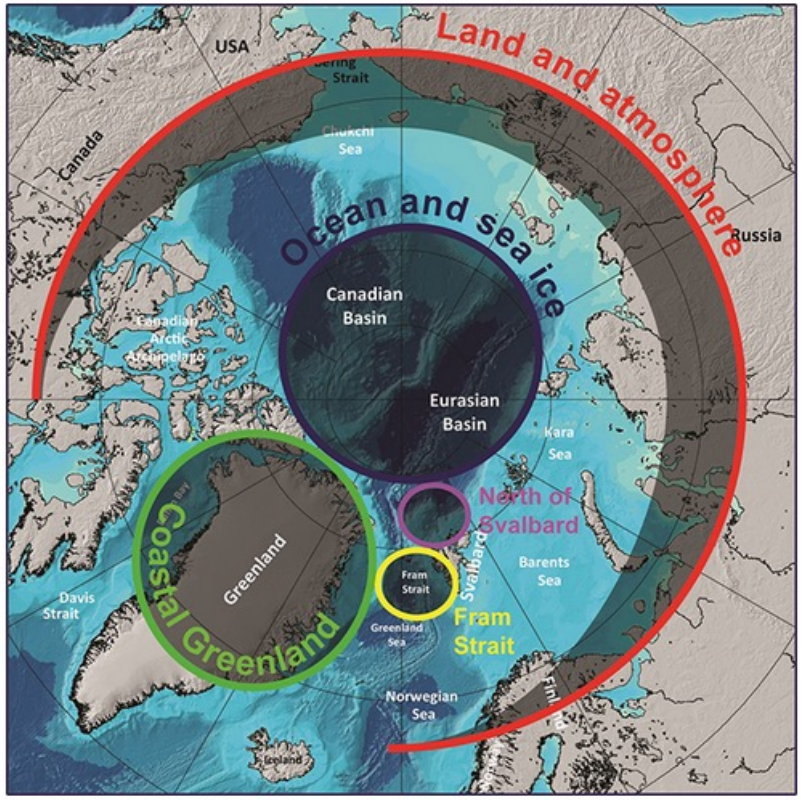
155 datasets **38** organizations **0** topics

Community Based Monitoring datasets and programs

INTAROS is working closely with several local communities and citizen science programs across the Arctic. In one of these programs, INTAROS partner GEUS is collaborating with the municipality in Qeqertalik, Greenland, to collect information on seismic activity. A pilot program with seismic stations operated by local community members have been established, and the data collected feeds into the Raspberry Shake Community and the GEUS' earthquake bulletin A data portal shown in image below gives access to the seismic data from this community. This and other CBM datasets can be found here.

Welcome to the INTAROS data catalogue

INTAROS collects data within key regions of the Arctic, and provides access to these datasets and other datasets of relevance to our targeted stakeholders. This Data Catalog contains descriptions of collected, derived and estimated datasets that are generated within the project.



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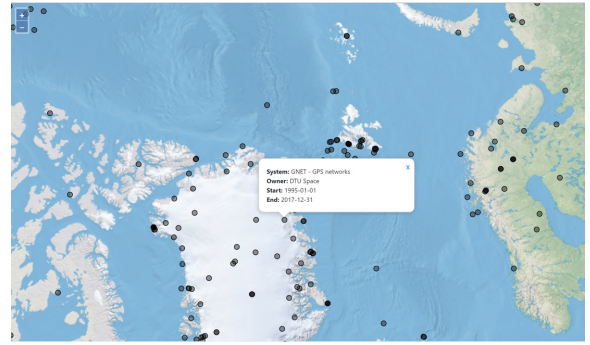
ARCMAP: inventory of in situ observing systems

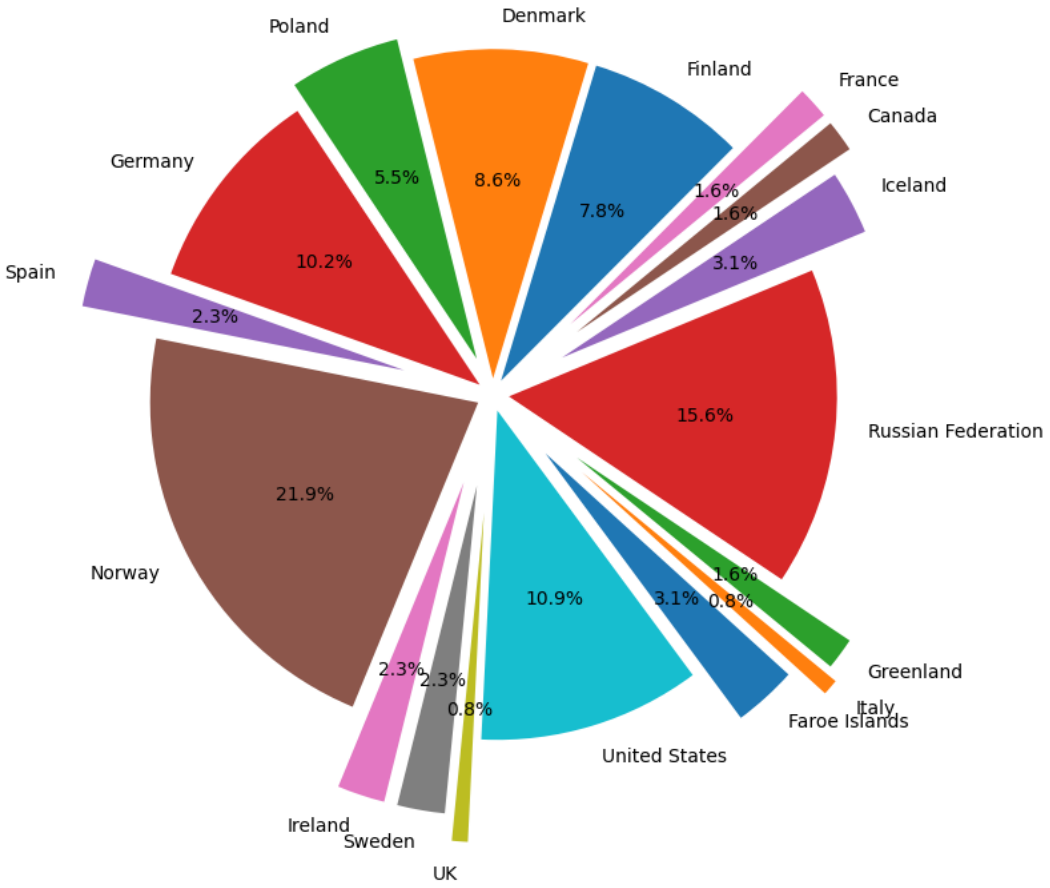
https://arcmap.nersc.no/

Map of points, areas, etc.

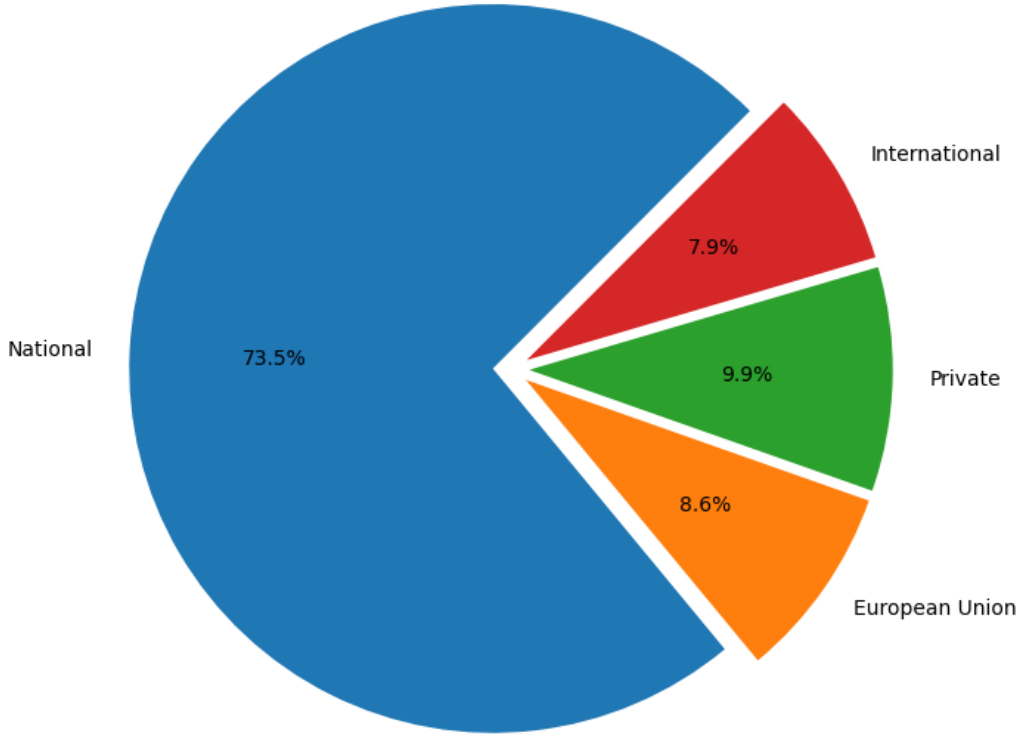


Registrered systems: 128 (May 2022)

Distribution by country



Distribution by funding



INTAROS Roadmap: how to improve and sustain the observing capacity in the Arctic

Main conclusions:

- Strengthen collaboration between countries, programs and institutions involved in planning, implementing and funding the observing systems
- Develop streamlined data delivery chains from sensors to users in collaboration between researchers, technology experts and service providers
- Adapt the observing systems to evolving technologies regarding sensors, platforms, data transmission including Arctic broadband, and digital methods to process and manage the growing amount of data

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https://intaros.nersc.no/content/roadmap-sustainable-arctic-observing-system-0