INTAROS – Integrated Arctic Observation System

A project funded by EC - H2020 2016-2021

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Overall objective: to develop an efficient integrated Arctic Observation System by extending, improving and unifying existing and evolving systems in different regions of the Arctic

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An integrated Arctic Observing System needs to include data from

- Atmosphere
- Ocean
- Terrestrial themes

on variables according to user requirements.

The largest gaps are in the in-situ observation network, which should provide:

- data that cannot be obtained from remote sensing
- data needed for validation of remote sensing
- data needed in modelling (forecasting, reanalysis, etc.)

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INTAROS field activities in 2017-2018

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

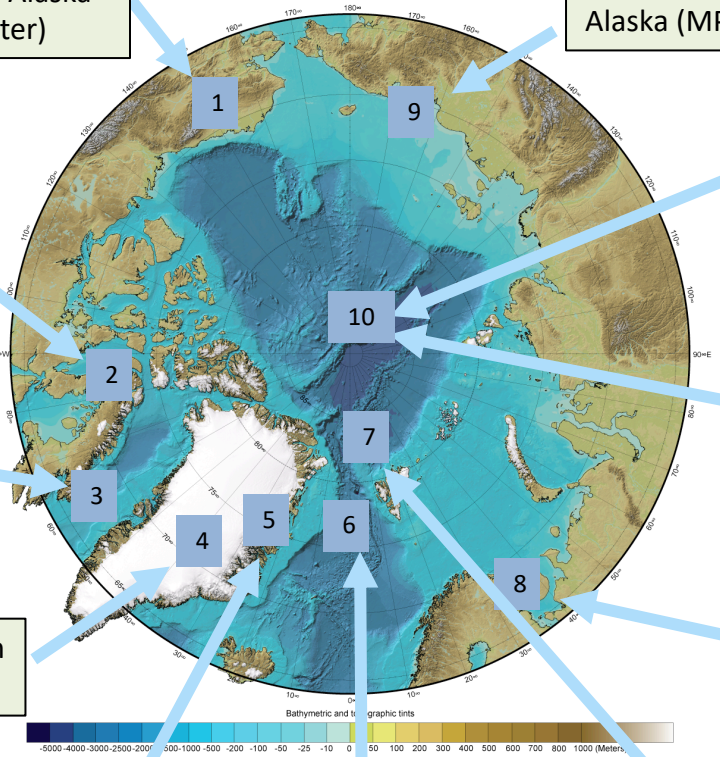
Observations of atmospheric C02 and CH4 in Siberia and Alaska (MPG)

Observing meteorological, snow and soil data from 4 location in Eastern Canadian Arctic by CNRS Takuvik

Oceanographic, sea ice and snow measurements in central Arctic from automated ice buoys (ITPs and IMBs) by FMI and IOPAN

Oceanographic and marine ecosystem data from bio-Argo floats in Baffin Bay by CNRS Takuvik

Atmospheric profiles and surface measurements in the central Arctic from icebreaker ODEN (Stockholm University)



PROMICE weather station data from Greenland Ice Sheet by GEUS

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

Oceanographical CTD sections In Young Sound fjord, as paft of the Greenland Ecosystem Monitoring program (Aarhus University)

Biogeochemical observations in the Fram Strait (Hausgarten) and Kongsfjorden (AWI and CNRS IUEM), and seismometer deployment (UIB)

Oceanographic, biogeochemical, ocean optics data collection north of Svalbard (NERSC, UIB, IOPAS, and CNRS LOCEAN)

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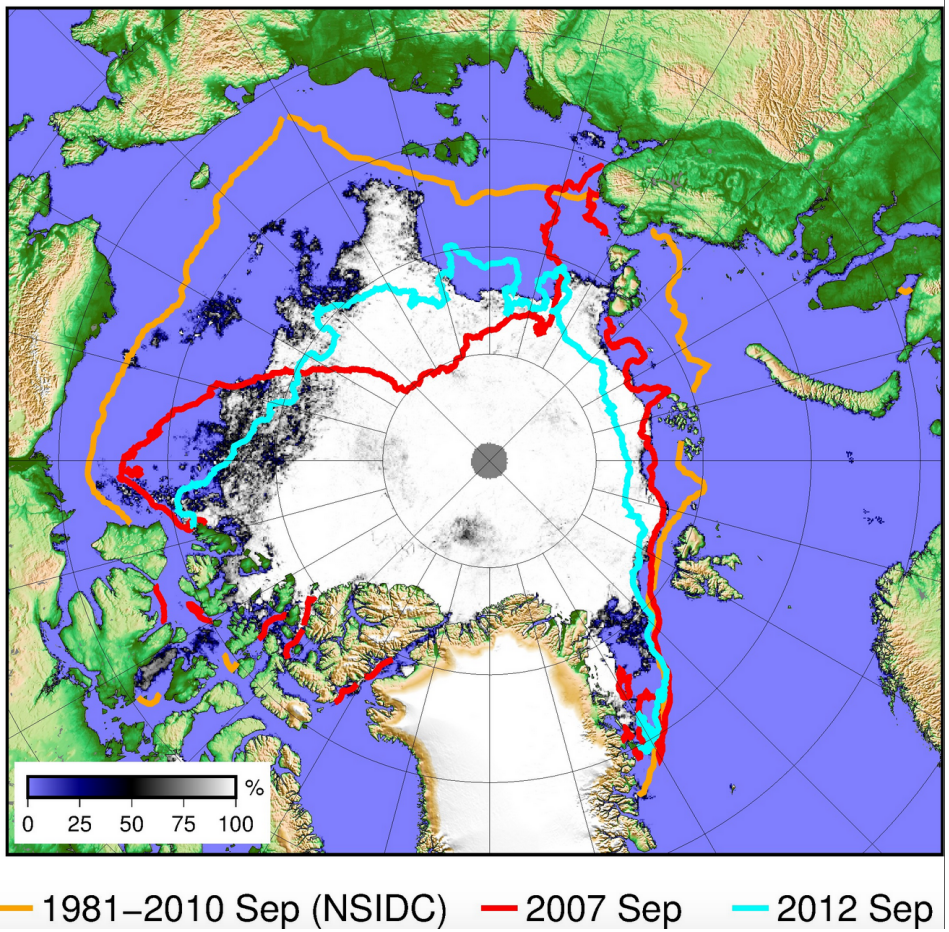
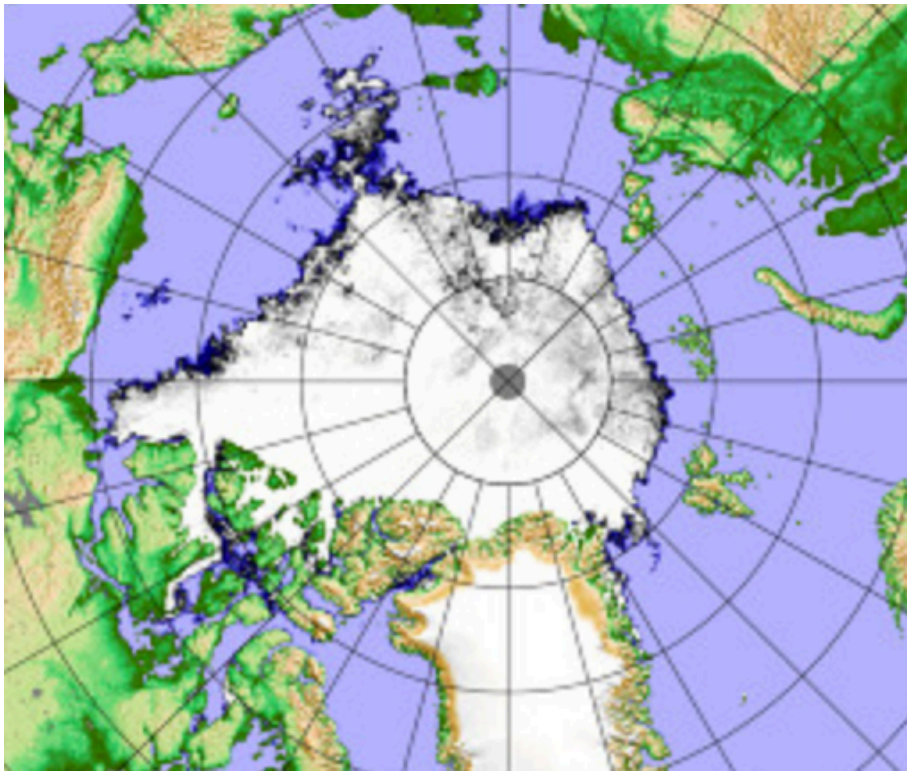
Arctic sea ice in summer

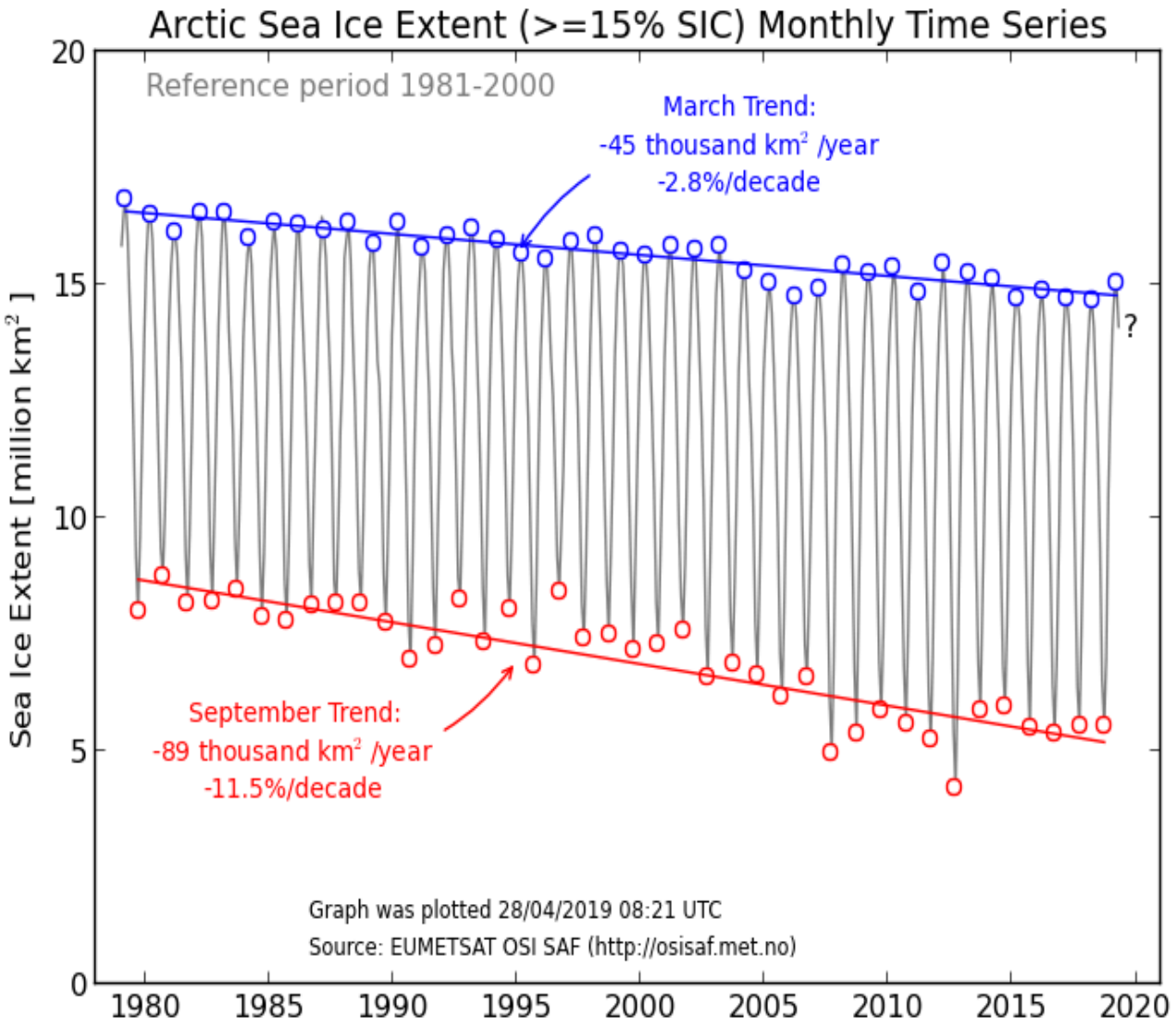
Sea Ice Concentration 06 September 2015



Sea ice concentration 15 September 2018



Arctic sea ice decrease in the last decades



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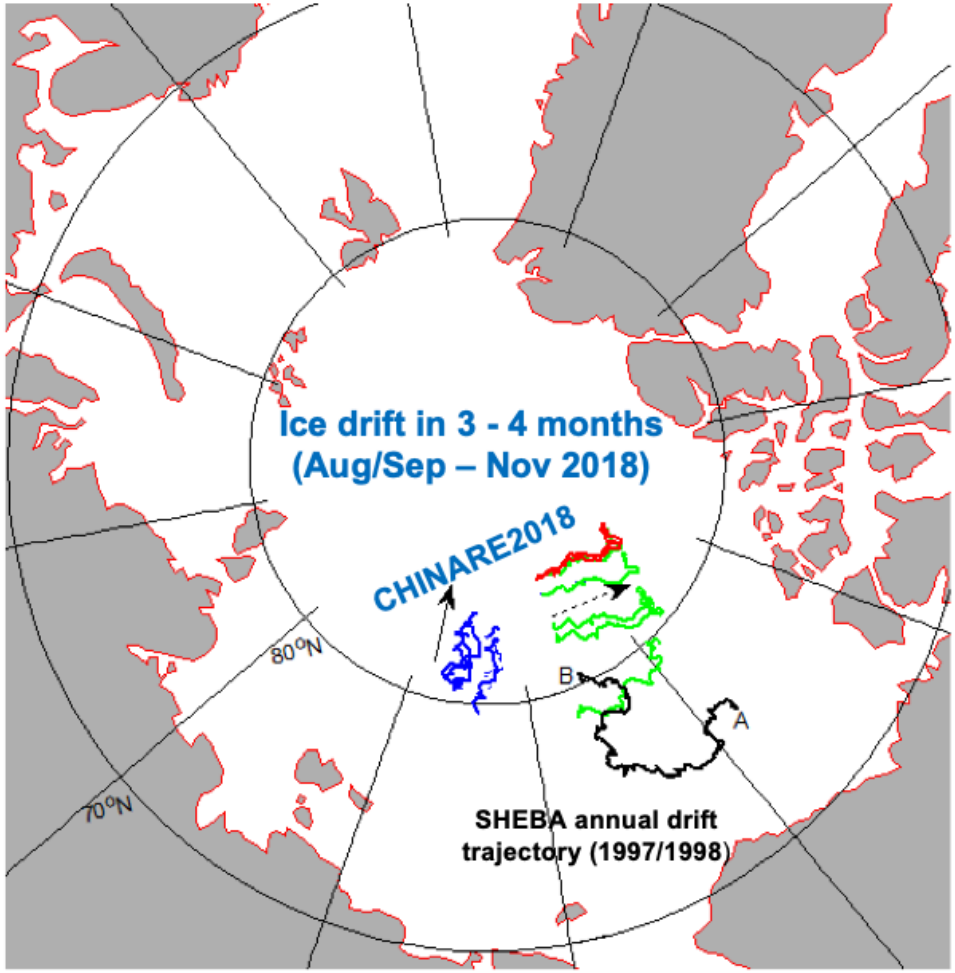
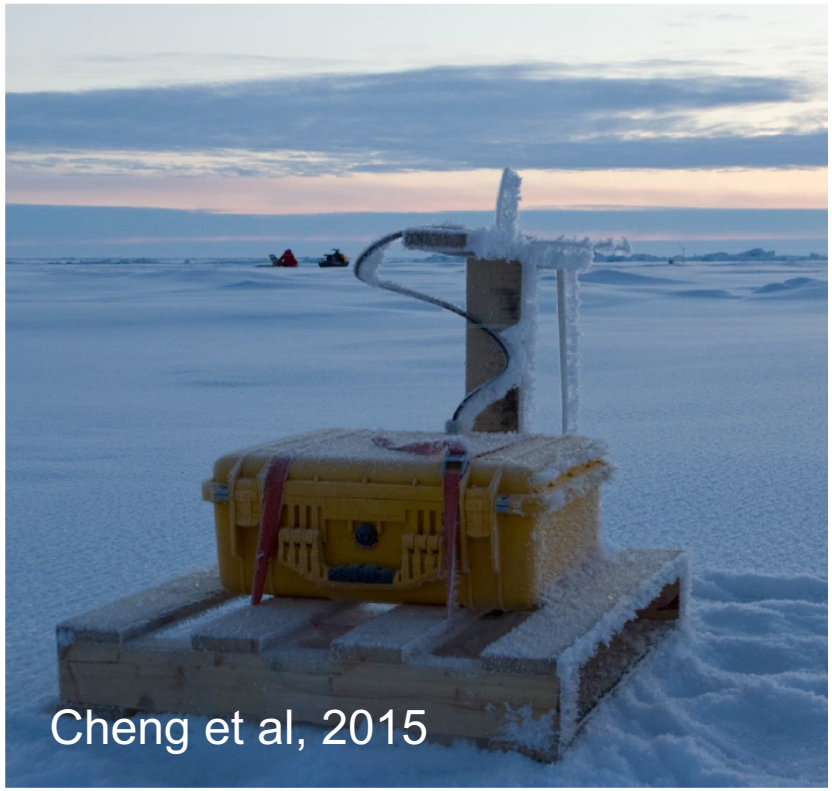
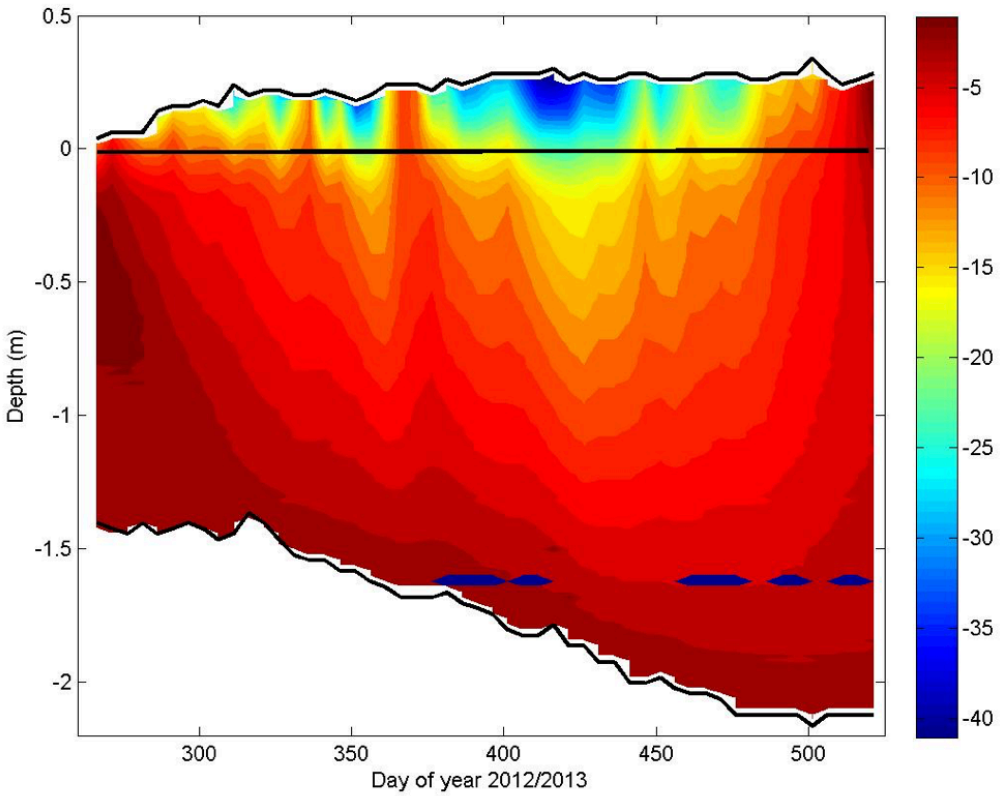
SIMBA ice mass balance buoy work in 2018



Cheng et al, 2018,AGU poster

Snow and ice thickness from the SIMBA buoys





- SIMBA measures high resolution temperature profiles in air-snow-ice-water.
- Interface detection based on temperature profile.
- Collaboration between FMI and PRIC

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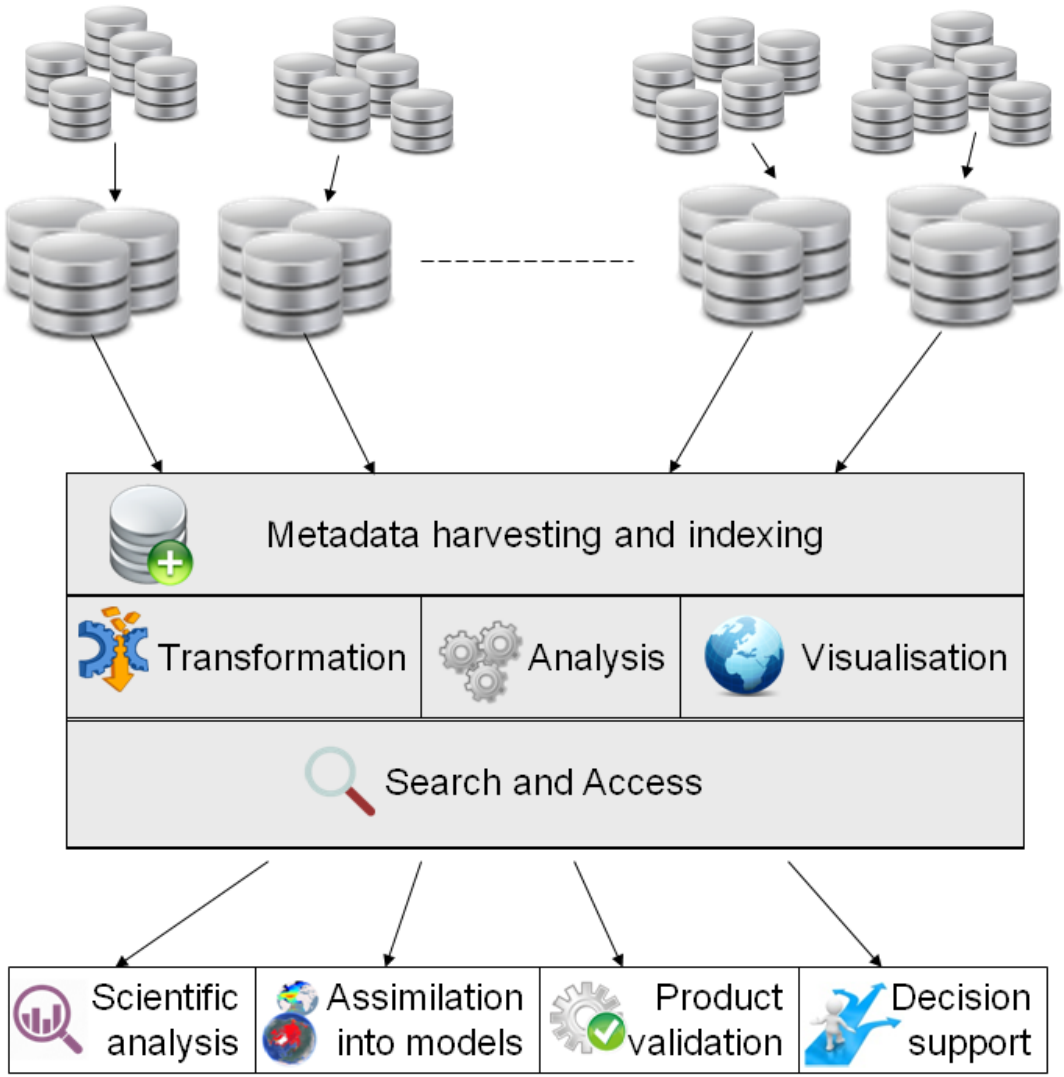
Structure of the integrated observation system



Distributed data centres

ACTRIS
Arctic Data Archival System
Arctic Data Centre
Alaska Ocean Observing System
CAFF
CMEMS
EPOS
ICOS
...
NMDC
NorDataNet
Ocean Networks Canada
...
PANGAEA
Polar Data Catalogue
SIOS
WMOS

iAOS

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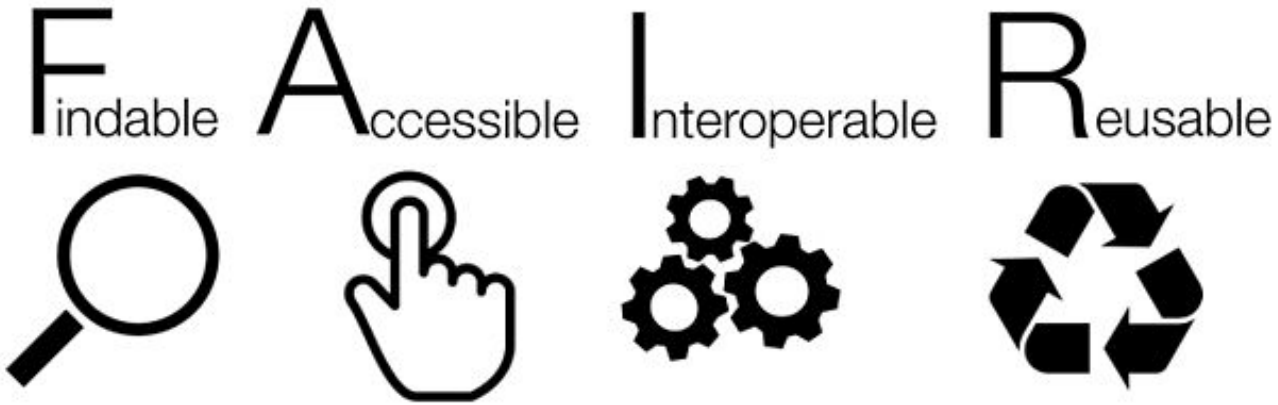
Data integration work

- Identify the existing and most suitable data repositories for atmosphere, ocean and terrestrial themes
- Need long term funding secured, a well documented data life cycle model and data governance framework
- Focus on compliance with FAIR principles
- Work to develop best practices for metadata and data
- Link to ongoing standardisation activities (e.g. ADC, IEEE)



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Challenges in building Arctic observing systems

(1) Develop coordination and collaboration between data providers and stakeholders in the pan-Arctic region in order to better use existing systems and resources (Organisation)

(2) Improvement of the observing platforms and sensors, filling of gaps in the observing network and facilitate for year-round operation, how to go from research to operational systems (Technology)

(3) Data sampling, transmission, calibration, processing, archiving and retrieval of required variables and build distributed and connected databases (Data dissemination, data management)

(4) How to develop sustainability of the observing systems, and what are the funding mechanisms ? (Funding)

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