In situ ocean observations in the Arctic

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Available methods with data transmission

Platforms*	Open Ocean	Ice-covered area	Surface	Vertical profiles
Surface buoys (ocean & ice)	x	x	x	(x)
Argo floats	x		x	x
Ice-tethered platforms		x	x	x
Ice Mass Balance buoys		x	x	x
Gliders	x		x	x
Ferrybox	x		x	
Sea mammals	x	x	x	x
Ship surveys (CTD, XBT, ADCP) with data transmission	x	(x)	x	x

- Not including coastal stations (tide gauges, HF radar, etc.)
- Not including new platforms (wavegliders, sailbuoys, etc.)

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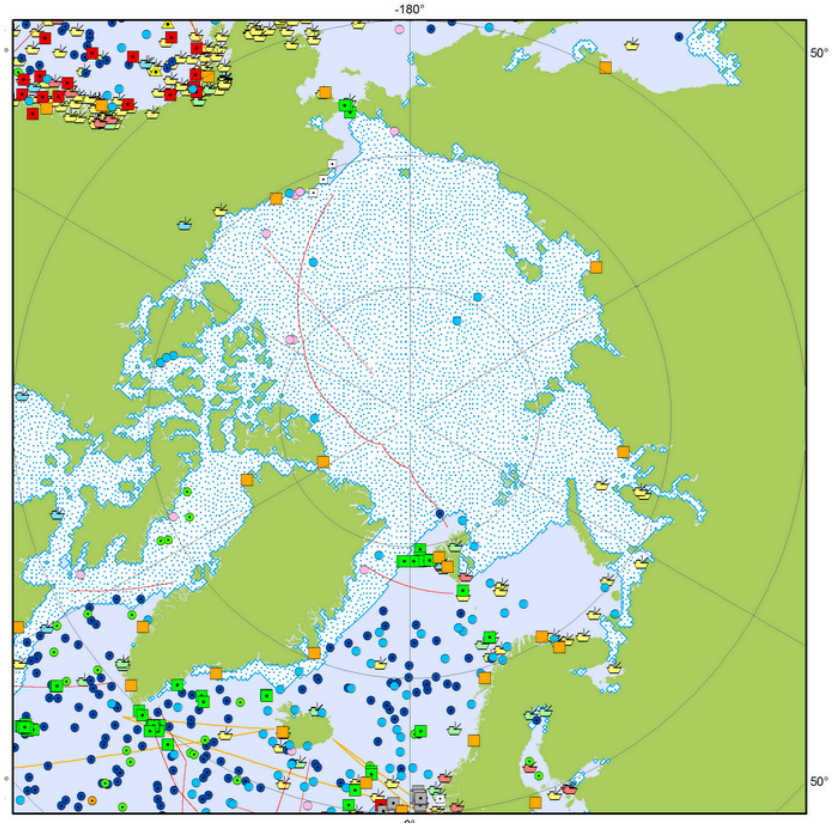
JCOMMOPS Integrated Polar – May 2018



Argo
- Argo (176)
- Deep-Argo (1)
- BGC-Argo (24)

OceanSITES
- Platforms (95)

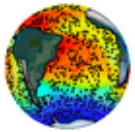
GLOSS
- Tide Gauges (25)

DBCP
- Surface Drifters (82)
- Fixed Platforms (21)
- Ice Buoys (14)
- Moored Buoys (19)
- Tsunameter (2)

GO-SHIP
- GO-SHIP (13)

SOT
- VOSClim-Automated (8)
- VOSClim-Manned (14)
- VOS-Automated (23)
- VOS-Manned (131)
- ASAP Radiosondes (1)
- SOOP XBTs (4)

Other Networks
- HF Radars (5)
- Animal Borne Sensors (1)



Generated by www.jcommops.org, 12/06/2018

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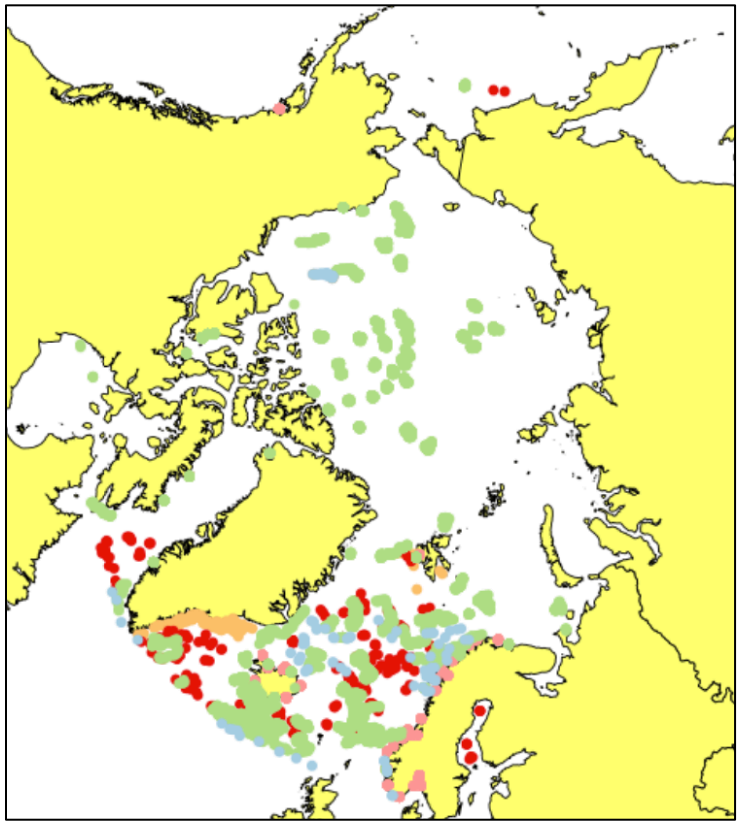
Arctic ROOS in situ data

Including surface drifters



CTD profiles

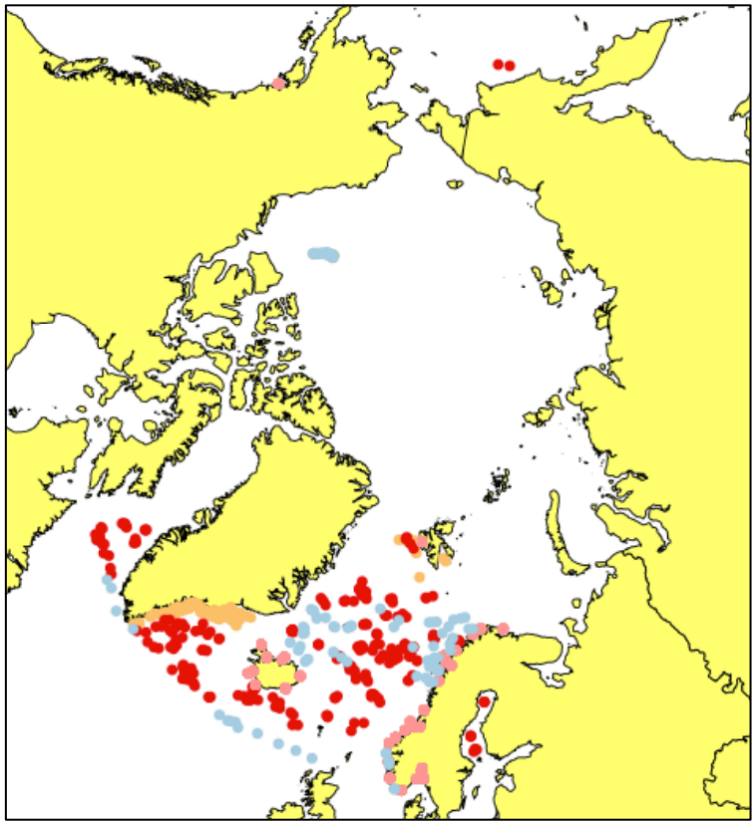
Drifting buoys

Moorings

Profiling floats

GTS_TESAC

Without surface drifters



Last 30 days from 29 June 2018

http://artic-roos.org/in-situ

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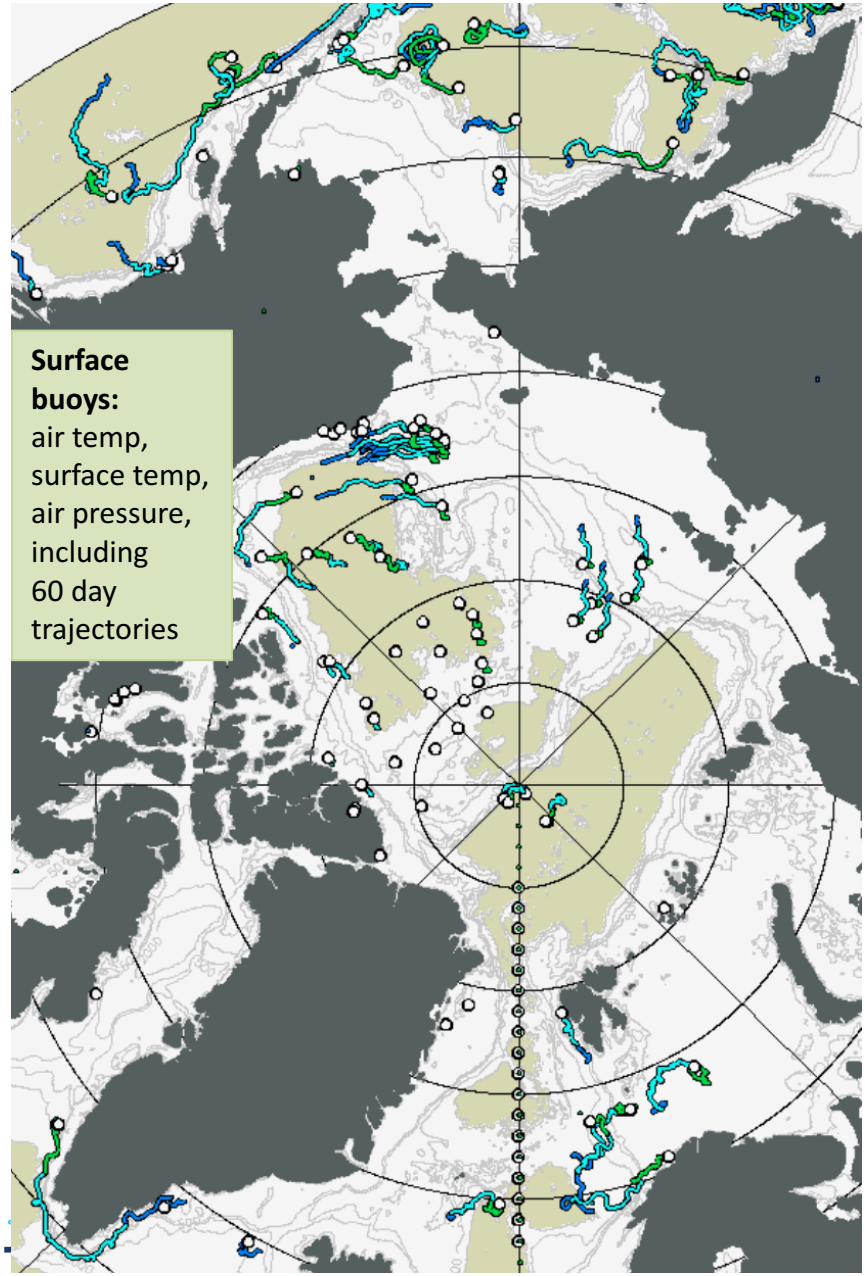
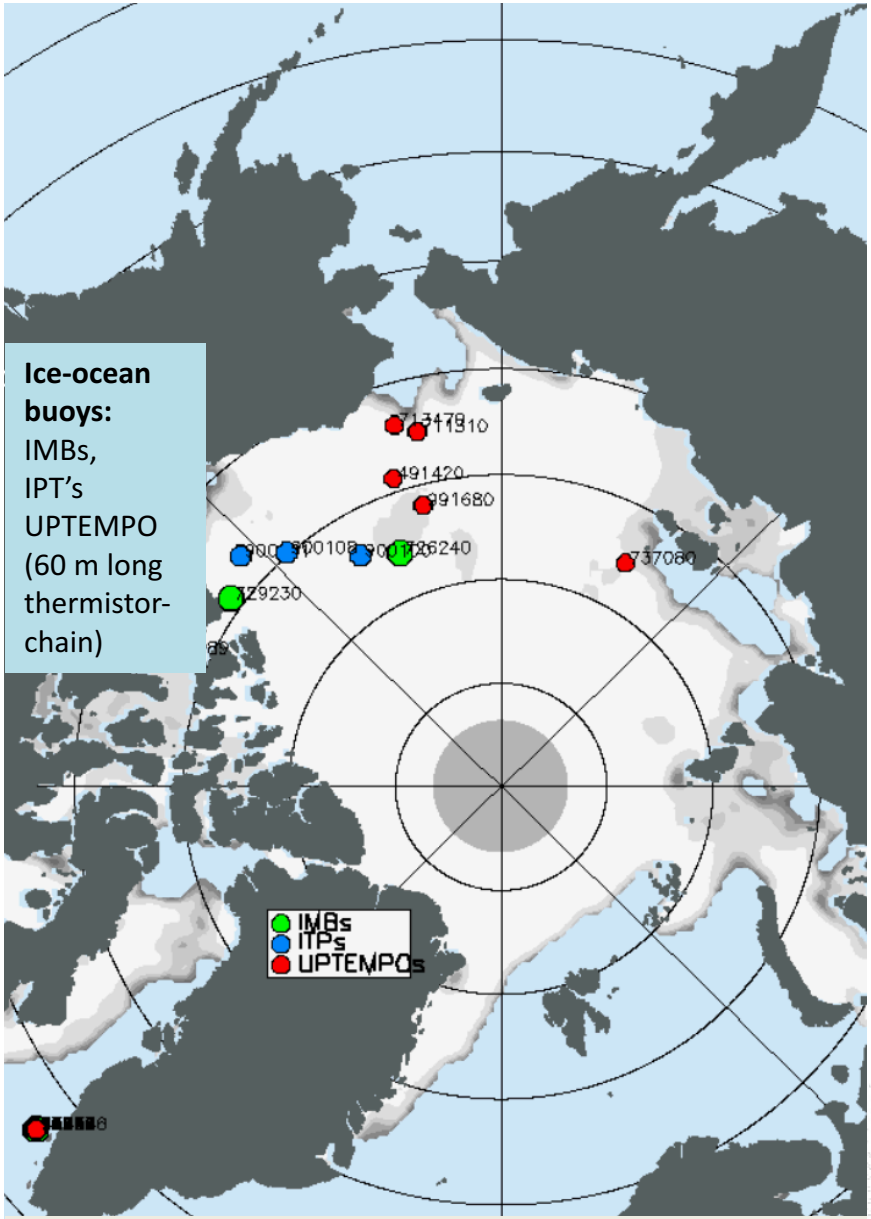
International Arctic Buoy Programme (21 June 2018)

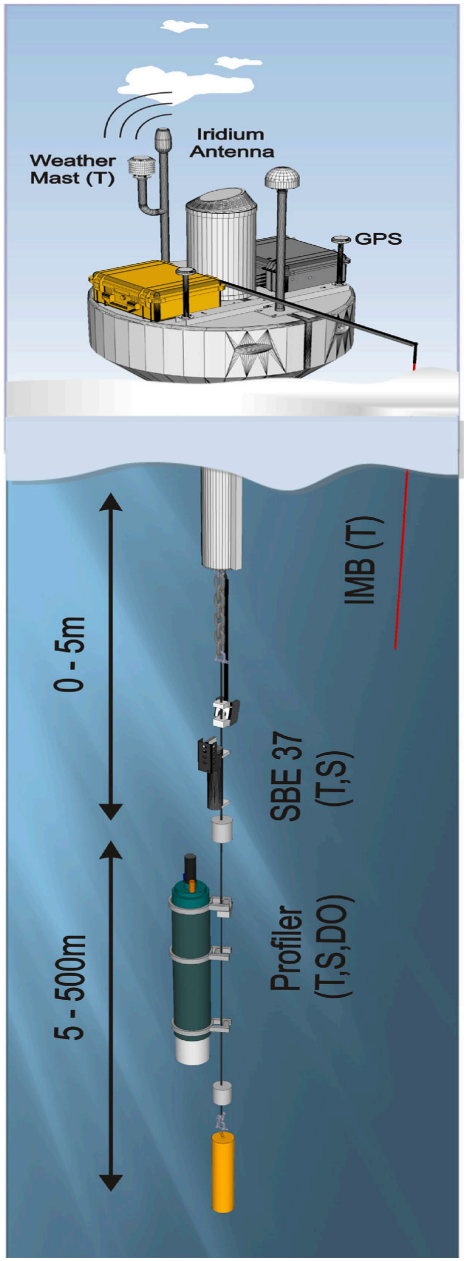


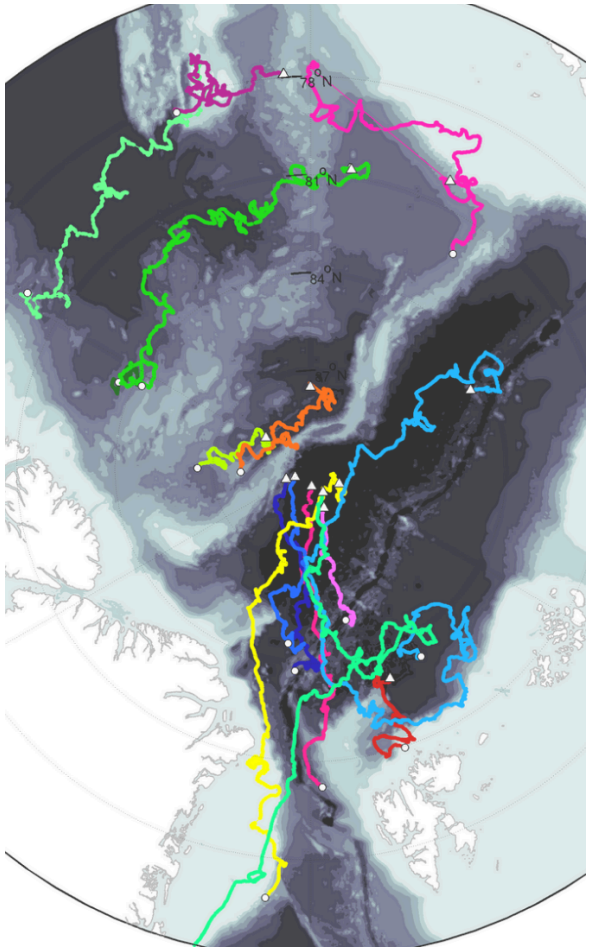


http://iabp.apl.washington.edu/maps_daily_map.htm

Ice-Tethered platforms

- IAOOS- Equipex platform includes an Ice-Tethered Profiler (ITP) and an Ice Mass Balance Buoy (IMB). The ITP gives profiles of ocean physical variables combined with biogeochemical sensors.





Trajectories of IAOOS platforms 2012 – 2018
http://iaoos.ipev.fr/index.php

http://iaoos.ent.upmc.fr/en/index.html

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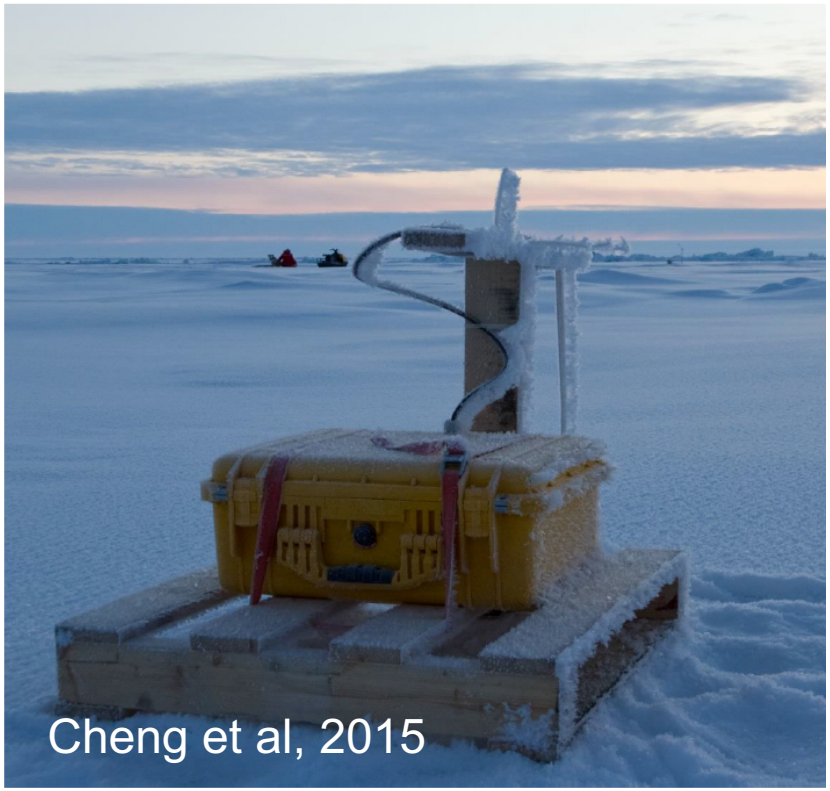
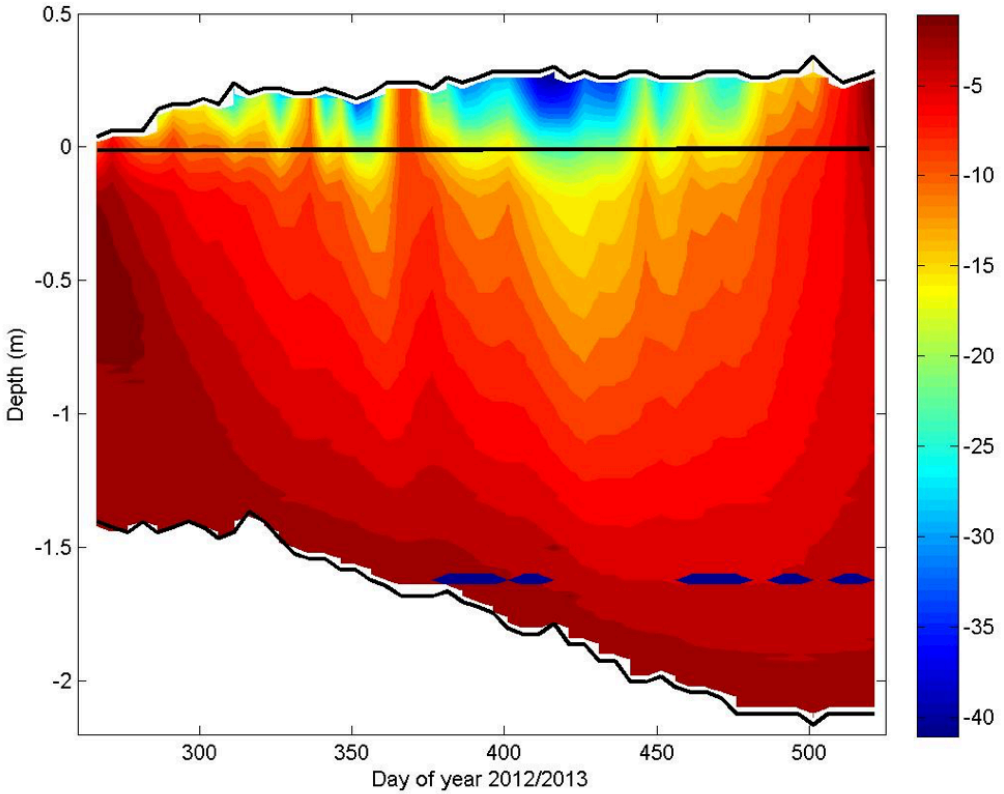
Ice Mass Balance buoys





- SIMBA measures high resolution temperature profiles in air-snow-ice-water.
- Interface detection based on temperature profile.
- Temperature rises differently in air, snow, ice, water in response to SIMBA daily heating cycles.

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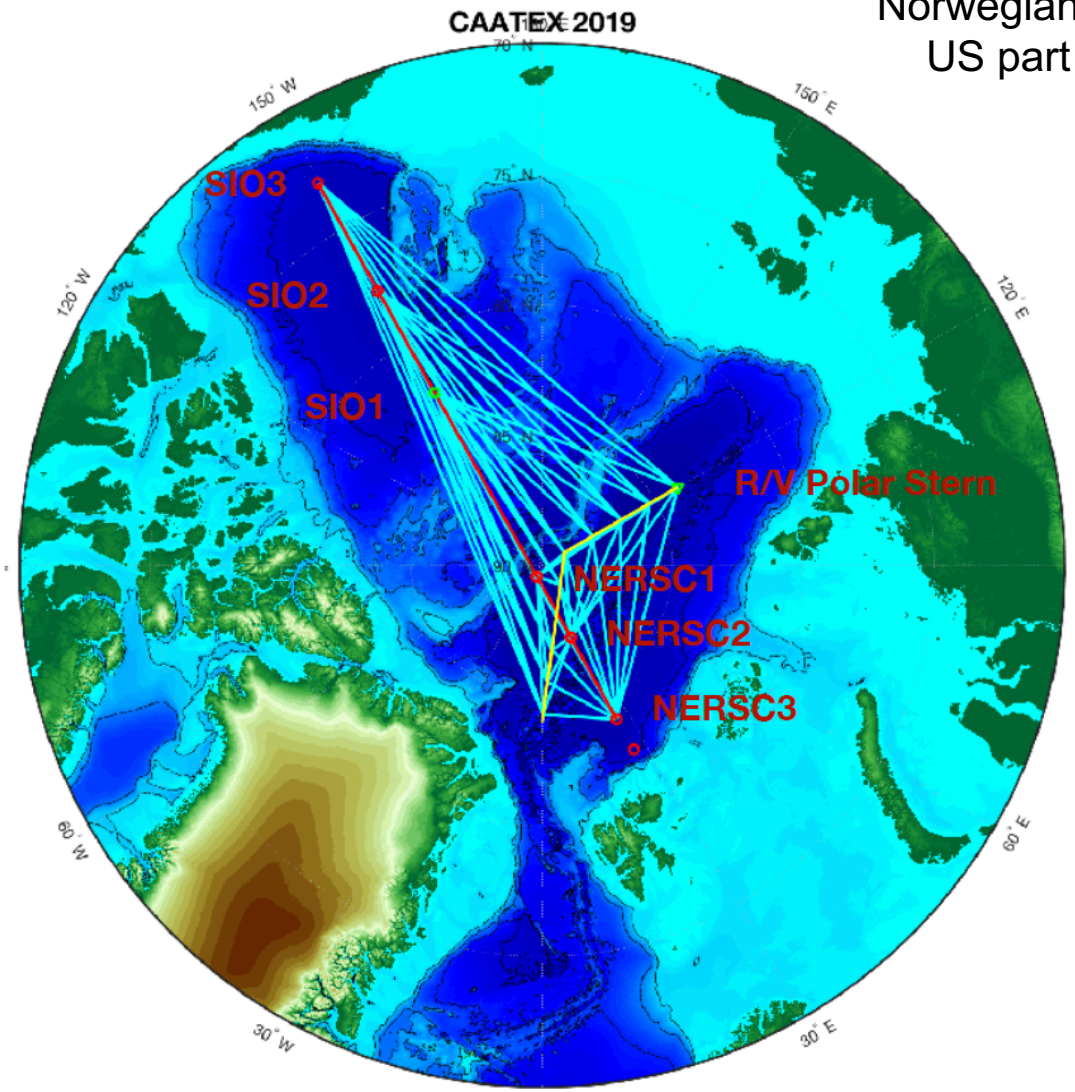
Coordinated Arctic Acoustic Thermometry Experiment (CAATEX)

A joint Norway-USA project (2018-2022) as part of MOSAIC



Norwegian part leder: Hanne Sagen (NERSC)
US part leader: Matthew Dzieciuch (SIO)

The project will use basin-wide acoustic thermometry and local ice-ocean observations in combination with an eddy-resolving ice-ocean model to produce improved ocean state estimates. This will be used to estimate the Arctic Ocean heat content and to benchmark global climate models.

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MOSAiC
The 2019/20 Arctic drift experiment

NERSC

Woods Hole Oceanographic Institution

European Commission

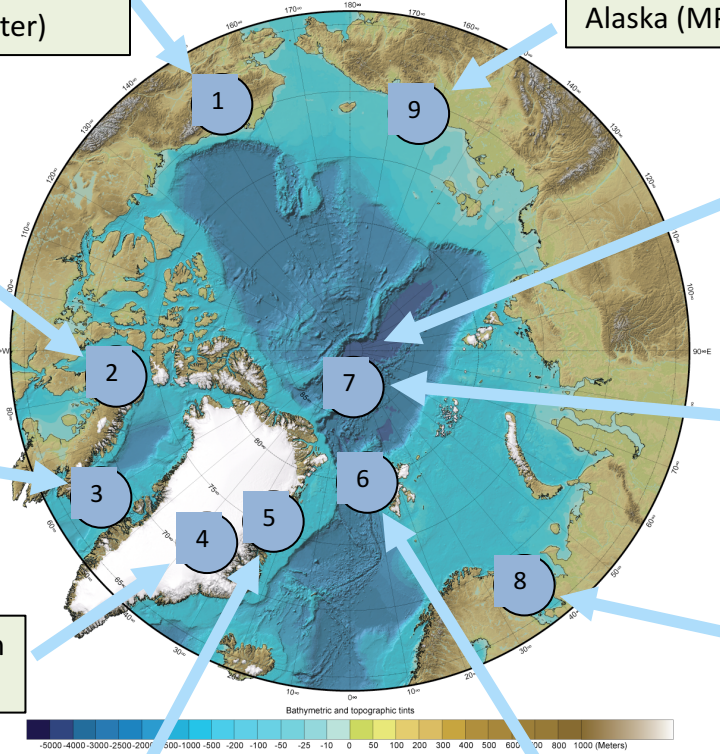
INTAROS field activities in 2017-2018

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 part of the Greenland Ecosystem Monitoring program (Aarhus University)

Satellite and aircraft observations of the Greenland Ice Sheet (GEUS, DTU, UPM)

- Biogeochemical observations in the Fram Strait (Hausgarten) and Kongsfjorden (AWI, CNRS IUEM)
- Oceanographic moorings north of Svalbard incl. biogeochemistry (IOPAN, UiB, IMR, NERSC, CNRS)
- Glider experiment by CNRS LOCEAN

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Contribution from INTAROS to in situ ocean observations

Near realtime data:

- 2 IAOOS platforms: 2018-2019-2020 (IOPAN)
- 4-8 SIMBA Ice Mass Balance Buoys (FMI)
- 7 Argo Floats in Baffin Bay with bio-optical sensors (CNRS Takuvik)
- Ferrybox between Tromsø and Longyearbyen (NIVA)
- Glider experiments in the Fram Strait (CNRS LOCEAN)
- AWIPEV observatory in Kongsfjorden, data transmission via cable, BGC variables, pH, CO2 (CNRS LOV)

Delayed mode data:

- Moorings north of Svalbard with physical and biogeochemical sensors, ULS, acoustic instruments (UIB, NERSC, IOPAN, CNRS-LOCEAN, IMR)
- Observatories in Hausgarten incl. BGC variables, pH, CO2 (AWI)
- Greenland Ecosystem Monitoring Programme (Univ. Aarhus)
- Contributions from US partners (Alaska Ocean Obs System +)
- Contributions from Japan, China, South Korea

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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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