Integrated Arctic Observation System Development

Activities in 2017

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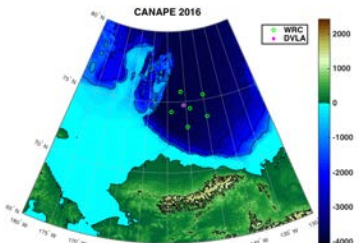
Overall objective

INTAROS is building an efficient integrated Arctic Observing System (iAOS) by extending, improving and unifying existing systems in different regions of the Arctic

During 2017 INTAROS has extended observations across land and sea areas of the Arctic

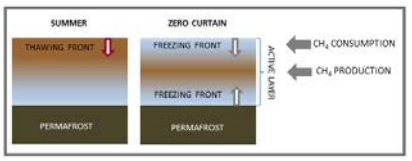
Multidisciplinary

observing systems covering atmosphere, ocean, sea ice, marine ecosystems, glaciology, snow, hydrology and other land surface processes, natural hazards and community-based systems



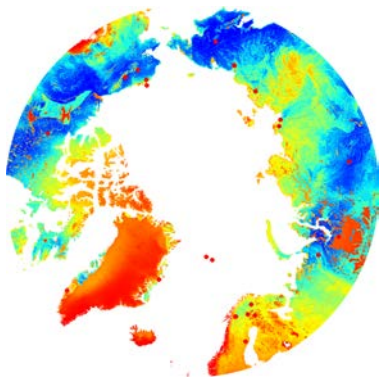
Seven acoustic and oceanographic moorings, deployed in the Beaufort Sea in 2016 were recovered in September 2017 from USCGC Healy, led by P. Worcester, Scripps Institution of Oceanography.

INTAROS contributes to five covariance towers providing year-round measurements of CH4 flux from different types of vegetation at five permafrost sites in Alaska. Ref. D. Zola, University of Sheffield



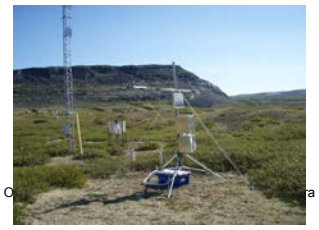
Hypothesized soil physical processes influencing CH4 production and oxidation depending on the time of the season. Ref. D. Zona

MPI-BGC researchers measuring soil water dissolved methane and carbon dioxide at Ambarchik, eastern Siberia.

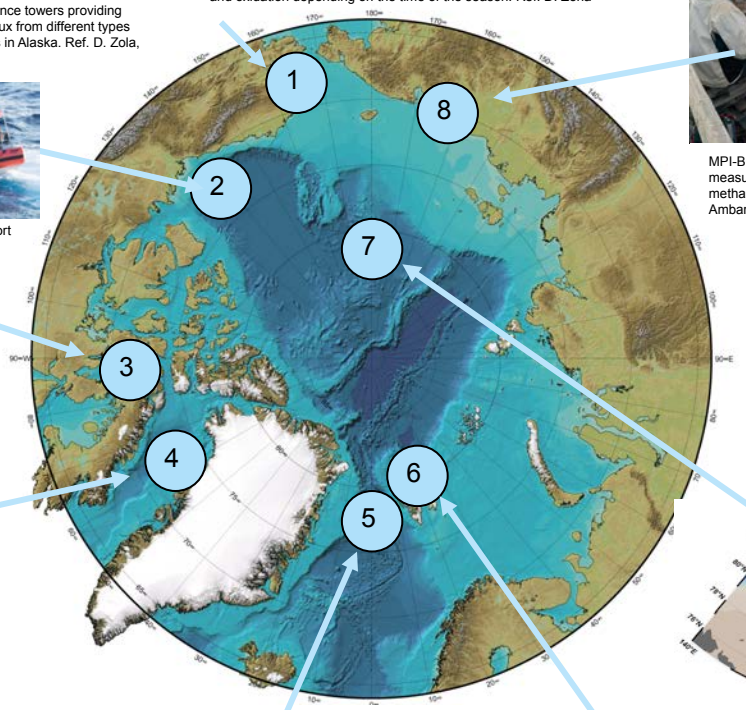


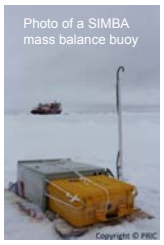
Station network representativeness based on 29 'prime sites' (red dots) around the Arctic. Blue is good match, red is no match. Ref M. Goeckede, MPI-BGC

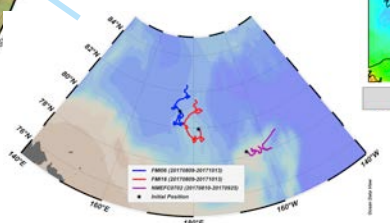
Recovery of a mooring in the Beaufort Sea (Photo E. Storheim, NERSC)



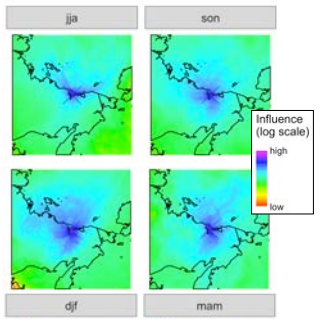
CNRS Takuvik has performed soil carbon measurements at Bylot Island (73 N, 80 W), drilling a few m deep in the permafrost. The institute has also measured carbon in soil at Umiujaq (Nunavik), and performed drone-borne lidar surveys in preparation for a winter campaign to measure snow depth as a function of vegetation cover. (Ref. R. Domine, Takuvik).



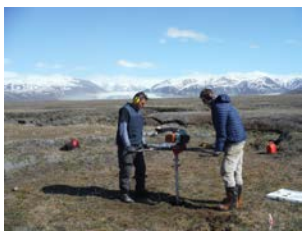




Deployment of three ice mass balance buoys by FMI during the cruise with the Chinese icebreaker RV Xuelong (Ref. NMEFC)



Tower footprint analysis showing the field of view from the Ambarchik station in 4 seasons (M. Goeckede, MPI-BGC)

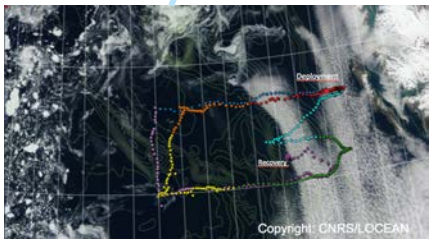


Drilling in permafrost to determine carbon stocks at Bylot Island (F. Domine, Takuvik)

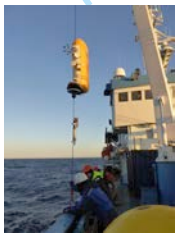
Ecological monitoring using passive acoustics deployed on the seafloor in Young Sound, Greenland. (Ref. CNRS-IUEM)

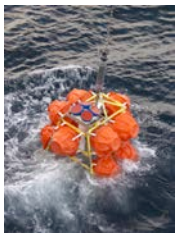
Picture of earth slide in Svalbard taken during a student field trip from in August 2017 (Photo L. Iversen).

Glider deployment in the Fram Strait (Ref. IOPAN)



CNRS-LOCEAN and IOPAN deployed a Slocum glider in Fram Strait from R/V Oceania in July. The glider mission laseted for two months and provided vertical sections of temperature and salinity across the Fram Strait





The IOPAN team onboard RV Lance recovered one and deployed four INTAROS moorings in the area north of Svalbard during the cruise in September. Two IOPAN moorings and two CNRS-LOCEAN moorings were deployed. Ref. A. Beszczynska-Möller.

A weather mast deployed on an ice floe in the Chukchi Sea during the CHINARE 2017 expedition with RV Xuelong (Photo: Q. Yang, NMEFC)

Workshop, May 10 2017, Fairbanks, Alaska

Session form the workshop. (Photo: Finn Danielsen)

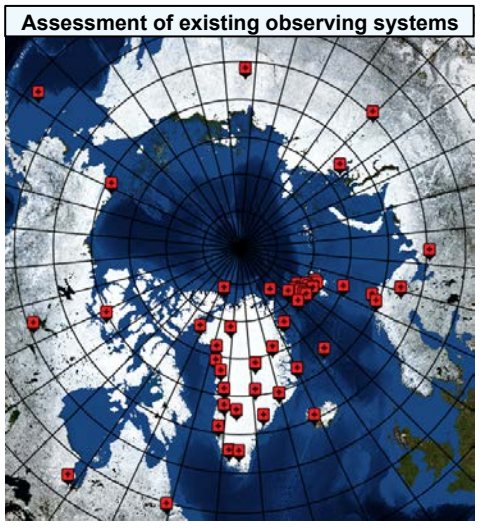
During the Arctic Week in Fairbanks, from May 8 – 12, 2017 INTAROS organised a workshop in collaboration with University of Alaska Fairbanks (UAF), the Yukon River Inter-Tribal Watershed Council (YRITWC) and the Exchange for Local Observations and Knowledge of the Arctic (ELOKA). The workshop offered an opportunity for practioners of Community-based monitoring (CBM) and observing programs to come together to exchange experiences and perspectives.

Good practices of CBM programs:

- Be collaborative, co-producing knowledge and projects
- Gather information that is relevant to communities, and adaptation needs
- Empower Indigenous peoples to address local decision making needs
- Utilize traditional knowledge to fill information gaps, especially baseline conditions
- Avoid duplication by building on what is already in place
- Build bridges between two worlds, Native and Science
- Have data sharing agreements in place, which are co-created by all parties involved and clear to all participants
- Share data with participating communities in locally accepted forms of communication (plain language reports, stories, newsletters)
- Contribute to communities through training, employment, honorarium; by providing information needed to inform
- decision making needs
- Be inclusive, including the youth, Elders, and women

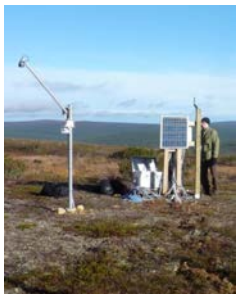
Photo taken during a Community-based observing activity in Russia (Photo: Martin Enghoff)

Assessment of existing observing systems



Preliminary map of in situ observing systems with in situ data collection, which have been surveyed. Each icon represent a station or an observing platform.

The aim of the survey is to evaluate the status of present observing systems with respect to the requirements to build the integrated Arctic Observing System (iAOS) Thhe survey is conducted through a set of online questionnaires at https://intaros.nersc.no/node/125



Automated stations for soil, snow and atmospheric properties (Ref. FMI)

List of surveyed observing systems

ATMOSPHERE
- GCOS Upper-Air Network (GUAN)
- Radiosonde stations not included in GUAN
- Global-GAW
- GRUAN (GCOS Reference Upper Air Network)
- WMO Integrated Global Observing System (WIGOS)
- ICOS
- PROMICE automatic weather station network
- Tower network for atmospheric trace gas mixing-ratio monitoring_NOAA
- Greenland Ecosystem Monitoring program
- Regional-GAW

OCEAN AND SEA ICE
- FRAM
- Fram Strait Multipurpose Acoustic System
- NIVA Barents Sea FerryBox
- A-TWAIN
- IOC tide gauge network
- R/V Håkon Mosby
- Piniarneq

LAND INCLUDING TERRESTRIAL CRYOSPHERE
- Greenland Ice Sheet Monitoring Network (GLISN)
- Greenland GPS Network
- Ameriflux, Fluxnet
- Airborne observations of surface-atmosphere fluxes
- GNET - GPS networks
- Federation of Icelandic River Owners
- Fávllis – Sámi Fishery Research Network
- Spring bird migration phenology

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Consortium members

Norway: NERSC, UIB, IMR, UNIS, NIVA, NORUT, DNV-GL
Greenland/Denmark: GEUS, DTU, GINR, NORDECO, Aarhus University
Sweden: SMHI, Stockholm University
Finland; FMI, University of Helsinki
Germany: AWI, Univ Hamburg, Univ Bremen, MPG-BGC, GFZ
UK: University of Sheffield, University of Exeter
Poland: IOPAN, IGPAN, Univ Slaski
France: CNRS, Ifremer, ARMINES
Spain: Polyt. Univ Madrid, Barcelona CS
Portugal: Eurocean
Belgium: EuroGOOS AISBL
Ireland: Maynooth University
Italy: Terradue, JRC
Russia: RIHMI-WDC, NIERSC
USA: UAF, SIO, WHOI, JPL
Canada: U Laval, ONC
China: RADI, NMEFC, PRIC
Japan: ROIS/NIPR
South Korea: KOPRI

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