INTAROS – Integrated Arctic Observation System

A project funded by EC - H2020-BG-09-2016
Coordinator: Stein Sandven and Hanne Sagen (deputy)
Nansen Environmental and Remote Sensing Center, Norway

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.
An integrated Arctic Observing System

Need to cover:
- Atmosphere
- Ocean
- Terrestrial Themes at appropriate time and space resolution

Main gaps are in the in-situ observing system
Specific objectives

- Establish a *Pan-Arctic* forum for collaboration across EU and non-EU countries and transnational organisations (WP1)
- Develop a *Roadmap* for building a sustainable Arctic observing system (WP1)
- *Exploit existing observing systems and databases* (WP2)
- *Fill gaps* of the present in situ observing systems (WP3)
- Enhance *community-based* observing programmes (WP4)
- Develop and implement *the iAOS platform* for integration of multidisciplinary data from distributed repositories (WP5)
- Conduct application studies using iAOS to selected stakeholders (WP6)
- Demonstrate *assimilation* into climate models (WP6)
Workpackage structure

WP1: Requirements and strategy for a Pan-Arctic system

WP2: Exploitation of existing observing systems

WP3: Enhancement of in situ systems

WP4: Community-based observing systems

WP5: Data integration & management - IAOS

WP6: Applications towards stakeholders

WP7: Dissemination and outreach

Scientific data

Community data

Integrated data, prepared for applications

Feedback to requirements, strategy and roadmap

Climate modelling

fisheries, marine, ecosystems

Natural hazards
WP1: Requirements and strategy for Pan-Arctic Observing Systems
Lead: S. Sandven

The main objectives of WP1 are to

(1) Review the high-level requirements and strategies for a Pan Arctic Observing System based on present initiatives

(2) Plan and coordinate the INTAROS activities in agreement with other Arctic projects, initiatives and stakeholder requirements,

(3) Strengthen European participation in Arctic observing networks and establish a Pan-Arctic Observation Forum

(4) Develop a roadmap for future sustainable Arctic Observing System

(i) GEO Cold Region Initiative (CRI), SAON and other international initiatives, related to the Arctic and European Blue Growth strategy;
WP2: Exploitation of existing observing systems
Lead: Roberta Pirazzini, FMI

- Task 2.1 Analyze strengths, weaknesses, and gaps of the existing observation networks and databases
- Task 2.2 Exploit selected datasets in order to increase the quality and number of data products
- Task 2.3 Enhance standardization of data and metadata to ensure that best practices are followed, and integrate sparse in situ data into established networks, preparing delivery to iAOS
- Task 2.4 Synthesis
ON-GOING: 4 QUESTIONNAIRES TO ASSESS AND CATALOGUE

Figure 2. Schematic illustration of the topics addressed in the three questionnaires

D: Community-based monitoring
QA: Survey of observing systems (29) and QB: datasets (26)

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
- Fávills – Sámi Fishery Research Network
- Spring bird migration phenology

Map of observing sites
WP3: Enhancement of multidisciplinary *in situ* observing systems

Lead A. B.-Möller

Develop and integrate autonomous and robust *in situ* systems for year round measurements of key variables

Deploy mature and new sensors and *in situ* platforms in selected reference sites and distributed observatories

Extend existing ocean and land infrastructures with multidisciplinary measurements by adding new biogeochemical sensors

Deliver geophysical, biogeochemical and biological data products for data integration (WP5), demonstration studies (WP6) and stakeholders consultations (WP7)
WP3 Deployment areas

Experiment areas:

• Coastal Greenland/Baffin Bay
• North of Svalbard towards the deep Nansen Basin
• Fram Strait and Kongsfjorden
• Central Arctic: Distributed systems for ocean and sea ice
• Pan-Arctic region: Distributed systems for atmosphere and land
INTAROS IS HELPING SUPPORTING FIVE EDDY COVARIANCE TOWERS IN ALASKA

Ref. Dona Zola, University of Sheffield, UK
Cryosphere

- In-situ cryospheric and land observations from past and new campaigns and research stations
- Use of satellite snow, hydrological, and ice mass change products
WP4: Community-based observing systems
Lead: F. Danielsen, NORDECO
Objective: Enhance community-based observing for participatory research and capacity-building
WP4 Tasks

Task 4.1 Survey and analyze existing community-based observing programmes in the Arctic

Task 4.2 Advance tools for cross-fertilizing indigenous and local knowledge with scientific knowledge

Task 4.3 Pilot community-based observing networks of relevant parameters for communities in Svalbard and Greenland to support local and national decision-making processes

Task 4.4 Make community-based observations accessible for iAOS
WP5: Data integration and management
Lead: P. Gonçalves, Terradue
iAOS – Systems Overview

**Partners’ data repositories**

**European data repositories**

**Non-European data repositories**

**PAGAEA**

**Scalable Hybrid Cloud Infrastructure**

**WP5**

**Development infrastructure**

**Hosting infrastructure**

**Cloud Platform**

**Processing services**

**Satellite data agency**

**Portal and applications**

**User**

**Satellite data repositories**

**Cloud controller**

**Processing services**

**Development infrastructure**

**Hosting infrastructure**

**Cloud Platform**

**Satellite data agency**

**Portal and applications**

**User**

**Satellite data repositories**
Objective

To demonstrate the benefits of an integrated Arctic Observing System through a suite of application studies towards research, governance, local communities and industry
Application studies for specific stakeholder groups

- Climate modelling and prediction
- Marine ecosystem understanding and management
- Ice-ocean statistics for decision support and risk analysis
- Natural hazards
- Greenhouse gases exchanges – atmosphere, ocean, land
- Local community interaction with scientific observing systems
- Support to marine and maritime industries
- Demonstration for fisheries and environmental agencies
Stakeholder engagement in INTAROS

- First workshop in Brussels 05 May 2017 with invited participants, addressing relative high-level requirements across the various disciplines and stakeholder groups.

- Dialogue with decision makers and policy bodies, jointly with other Arctic projects and the Commission

- Stakeholders in each of the thematic areas (Atmosphere, Ocean and Seafloor, Sea ice, Marine Ecosystem, Terrestrial sciences, Glaciology, Natural hazards, and Community-based monitoring

- Stakeholder and Innovation Advisory Panel, ca 5 members, will be appointed and participate in the project

- Follow-up workshops
INTAROS: Executive board

Stein Sandven, Coordinator, (NERSC)

Hanne Sagen, Deputy Coordinator (NERSC)

Agnieszka B. Möller (IOPAN)

Roberta Pirazzini (FMI)

Finn Danielsen (NORDECO)

Ralf Doescher (SMHI)

More info at www.intaros.eu