

The Nansen LEGACY

<http://site.uit.no/nansenlegacy/>



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Areas of contribution

User-aspects and verification

Polar atmospheric processes

Oceanic processes

Modelling and forecasting

Education

Observations

Sea ice processes

Data archiving

Summary

The Nansen LEGACY project explore the integrated nature of environment, climate and ecosystem. The living Barents Sea is evolving under external constraints of physical forcing, and direct and indirect human impacts. The consequent management of the region and resources should be informed by, and based on the past, present and future. The new Norwegian ice-breaker Kronprins Haakon will be a core facility.

The team reflects the complementary scientific and logistic capabilities of the eight participating governmental

institutions committed to Arctic research, and to the Barents Sea region in particular. Recruitment of a new generation of polar researchers equipped with interdisciplinary knowledge and emerging tools is an important task.

The Vision:

LEGACY will establish a novel and holistic Arctic research platform and provide the integrated scientific knowledge base required for the sustainable management of the environment and marine resources of the Barents Sea and adjacent Arctic Basin through the 21st century.

Description

The Nansen LEGACY research focus explores the living Barents Sea with its complex communities and interactions evolving from natural forcing and human impacts – during past, present, and future. The sustainable management of the region and resources resides with our capacity for assessing the future. Research activities includes five years of intensive field work using the ice-going research vessel Kronprins Haakon, development of technology for future Arctic observation systems, data management, and the cross-project effort to move Arctic predictive capabilities beyond state-of-the-art and disciplinary boundaries by combining empirical evidence and dedicated model systems.

In particular relevant for YOPP are

1. Observations:

The new Norwegian research vessel Kronprins Haakon will be utilized in total 300 days within the period from 2018 to 2022.

On the research vessel an automatic radiosonde launching system will be installed. It is planned for daily (12:00 UTC) radiosonde launches with real-time provision to the GTS. In addition, observations from a weather mast (Vaisala AWS430, incl. wind, temperature, pressure) and from other ship sensors (e.g. ocean temperature, surface radiation) are recorded. Furthermore, it is planned for dedicated process cruises where additional observations of atmosphere (e.g. buoys, flux tower), ocean (e.g. CTD, wave buoys), and sea-ice (e.g. EM bird) are taken.

2. Model development:

A high-resolution (2.5 km horizontal resolution) coupled atmosphere-wave-ocean-sea ice forecasting system will be developed. It will cover large parts of the European Arctic. The atmospheric model is based on the AROME Arctic convective scale forecasting system with a 3DVAR data assimilation system. The ocean and sea-ice model is based on ROMS and CICE, respectively, with a 4DVAR data assimilation system. The wave model is the ECMWF WAM model. Model systems will be coupled by OASIS-MCT.

3. Forecast verification:

Polar forecast verification and end-user focused forecast products will be developed.

Timeline

2018-01-01 - 2023-12-31

User relevant aspects

Improved weather-to-climate forecasts

Regional emphasis

Northern hemisphere: Yes

Southern hemisphere: No

Further specification

Specific focus on the European Arctic.

Key project deliverables

Key objectives of the project

1. Improve the scientific basis for sustainable management of natural resources beyond the present ice edge
2. Characterize the main human and physical influences on the changing Barents Sea ecosystems and their response – in the past, present, and future
3. Resolve the mechanisms governing the Barents Sea ice cover and climatic state, including predictive capability
4. Optimize use of emerging technologies, logistic capabilities, research recruitment and stakeholder interaction to explore and manage the emerging Arctic

YOPP related deliverables:

1. Observations:

- ocean and atmosphere measurements from ship sensors along the research cruises with the research vessel Kronprins Haakon (cruises described below);
- daily radiosonde launches (12:00 UTC) from the research vessel Kronprins Haakon (cruises described below);

- on some of the research cruises it is planned for additional observations of atmosphere (e.g. buoys, flux tower) and ocean (e.g. wave buoys), details will be decided at a later stage.

2. Model development:

Sensitivity experiments with the high-resolution coupled forecast system, (e.g. different coupling strategies) will be performed.

3. Forecast verification:

Polar forecast verification and end-user focused forecast products will be developed.

Data management

A metadata-driven approach will be utilized, which will ensure interoperability with national and international systems and frameworks, including WMO's systems, YOPP, and many other Arctic data centres.

Is data provided to WMO Global Telecommunication System

Yes

Timelines

Location	Latitude	Longitude	Start date	End date	Activity
Northern Barents Sea			2018-08-01	2018-10-19	radiosondes; ship sensors
Northern Barents Sea			2019-08-01	2019-08-24	radiosondes; ship sensors
Northern Barents Sea			2019-10-25	2019-11-13	radiosondes; ship sensors
Northern Barents Sea			2020-01-10	2020-02-24	radiosondes; ship sensors
Northern Barents Sea			2020-05-01	2020-05-24	radiosondes; ship sensors
Northern Barents Sea			2020-08-13	2020-09-02	radiosondes; ship sensors
Northern Barents Sea			2021-08-01	2021-09-26	radiosondes; ship sensors
Northern Barents Sea			2022-07-01	2022-07-20	radiosondes; ship sensors