

SWARP

Ships and Waves Reaching Polar regions



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Broken sea ice in the Fram Strait in September 2013, seen from the Norwegian icebreaker KV Svalbard.

ABSTRACT

SWARP aims at extending operational services supporting maritime transport safety in the Marginal Ice Zone (MIZ) to include forecasts of waves in ice-covered seas, forecasts of sea ice in the presence of waves, and remote sensing of both waves and sea ice conditions in the MIZ. These will enhance the Copernicus downstream services in Polar Regions. Besides maritime transport, SWARP also targets offshore operations, civil security, and coastal and environmental management in the Arctic.

MONITORING AND NUMERICAL PREDICTION OF WAVES IN THE MARGINAL ICE ZONE FOR SAFER NAVIGATION

The sea ice is retreating from the Arctic, stimulating dreams of industrial developments and touristic exploitation. But the ice-free ocean leaves room for generating long waves that penetrate the MIZ. These waves-in-ice are dangerous for human lives, material property and the environment (for example they represent a risk factor for oil spills).

However, there are currently no services providing any information about either the waves themselves or their effects on the ice state (in particular the distribution of ice floe sizes). The monitoring and forecasting systems developed in SWARP aim to become operational by the middle of the project, filling a gap in the present marine services of Copernicus.

A waves-in-ice model will be first validated and then included in the downstream forecasting services provided by MyOcean (Arctic Marine Forecasting Center) and as part of Prévimer (global wave forecasts).

In addition to wave and sea ice forecast models, the project will develop satellite observation methods for waves in-ice and other ice properties in the MIZ.

Existing and new satellite observing systems, especially Synthetic Aperture Radar (SAR) data, will be utilized for retrieval of waves and ice properties in the MIZ. The project will run operationally using data from future Copernicus satellites, such as Sentinel-1. The project will also integrate the new met-ocean services into state-of-the-art technology for onboard navigation and shore-based contingency planning. The maritime transport user group is directly involved in the project through the participation of an innovative SME, (NAVTOR AS) that is developing the navigation and planning software.

QUESTIONS & ANSWERS

What is the project designed to achieve?

The project is designed to bridge together three scientific disciplines: operational modelling of waves, operational modelling of sea ice, and satellite remote sensing. It will make extensive use of the new ESA Sentinel-1 satellite and of the MyOcean marine services. The project also anticipates the application of new regulations for "paperless navigation".

Why is this project important for Europe and how does it benefit European citizens?

Europe has ambitious plans to use the Arctic for navigation, while aiming at protecting its vulnerable ecosystem. SWARP will provide a dedicated waves-in-ice service onboard ships, by including the new waves and sea ice data into the Electronic Chart Display and Information System. This information will help in the planning of safe Arctic maritime voyages, taking into account risks of waves in ice.

How does the project exceed the current state of knowledge?

As of today there is no system capable of predicting or even providing information on the presence of waves in ice-infested waters over large areas. The project will therefore make new knowledge available through navigation technology, and also through public information systems – such as those dealing with search and rescue operations and dispersion of oil spills.

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LIST OF PARTNERS

- Nansen Environmental and Remote Sensing Center (NERSC), Norway
- Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER), France
- Scientific foundation Nansen International Environmental and Remote Sensing Centre (NIERSC), Russia
- Natural Environment Research Council (NOC), United Kingdom
- NAVTOR AS, Norway
- Université du Québec à Rimouski (ISMER), Canada
- University of Otago, New Zealand
- OCEAN DATA LAB SAS, France

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PROJECT INFORMATION

Ships and Waves Reaching Polar regions (SWARP)

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