



Sea ice monitoring in the Polar regions

<http://icemon.org>

Poster editor: T.S-Andreassen with contributions from Stein Sandven¹

ICEMON

The overall objective of ICEMON is to design and implement an integrated monitoring service for sea ice and related atmospheric and ocean processes in Polar Regions using satellite earth observation data in combination with in situ observations and modeling methods.

The objective will be met by defining the optimal utilization of the current and future EO satellites. This will provide:

- New sea ice data for climate monitoring and research
- Improved EO data products for use in environmental monitoring
- Increased safety of marine operations in target areas
- Improved operational weather and ice services

User groups and area

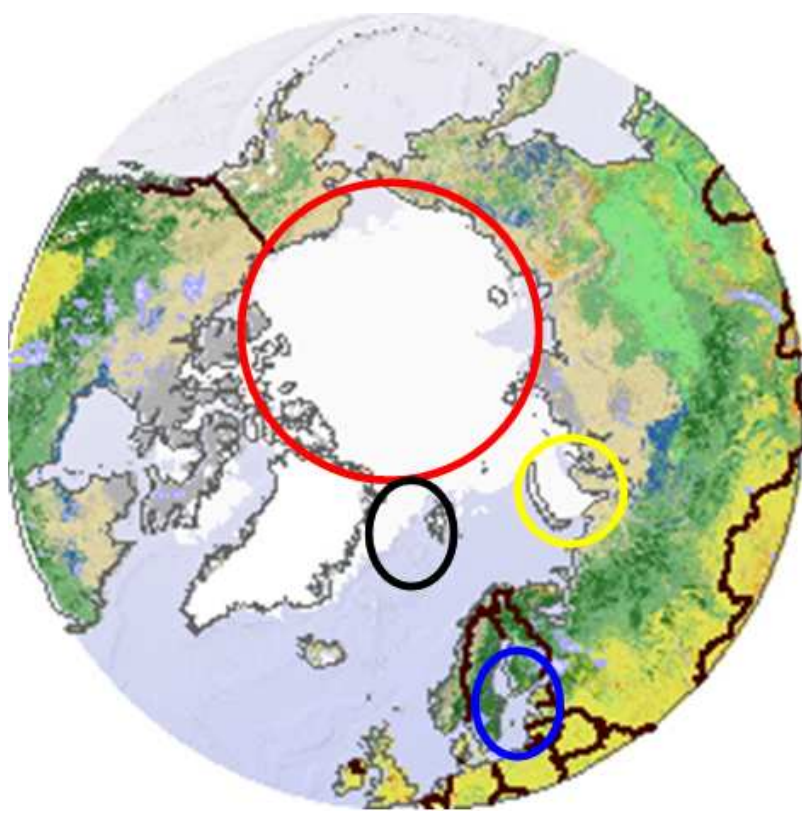
ICEMON will target all user groups that need information about the sea ice parameters. The goal is to be the **one portal and network** to information about sea ice, both near real time and long statistical series. A very important effect of having a large user base is the ability to ensure the best collection of data. The means to this are financial agreements and establishing operational data collection strategies.

The focus of ICEMON is the ice covered areas in the northern hemisphere. In the future global cover will be ensured through cooperation with other projects working with EO monitoring for environment and security.

"For the icebreaker assistance and operations in the Northern Baltic and Finnish waters we are dependent on good, reliable and up-to-date ice information based on satellite data. This service is used daily during the winter season in order to perform planning, operations and management of winter traffic with high quality. For us it is also important that such services are further developed to give better quality, accuracy and more real time images to meet the future challenges with growing traffic density in the Baltic Sea areas."

Markku Mylly, Director
Shipping Division Finnish Maritime Administration

Target areas of ICEMON. Red circle covers arctic polar cap ice and surrounding coasts, yellow circle covers the Kara sea, blue circle covers the Baltic sea and black circle covers Svalbard.



The GSE Objectives

- **Short term** : Foster maximum use of EO-based services in support of European policies on Environment and Security.
- **Long term** : Establish case for future EO-based operational services to deliver policy-related info for the benefit of Europe's citizens.



ICEMON is a response to the invitation from The European Union and European Space Agency to consolidate and define the future of the service element(GSE) within the programme Global monitoring for environment and security (GMES).

The ICEMON Consortium

The ICEMON consortium is meant to cover the whole chain from data acquisition to end users, and all sea-ice areas except the Antarctic. ICEMON is an open service partnership and is always interested in including other key service providers and users. In 2004 Insitute of Environmental Physics at the University of Bremen has joined ICEMON as a partner. The Euroclim project (environmental and climate information) and the IRIS project (modelling) has also joined as associated partners. There has been a workshop in St.Petersburg which adressed the cooperation between ICEMON and the Russian sea ice community.

To prepare for the next phase of GMES, ICEMON will team up with another GMES project Northern View, to deliver a common proposal.

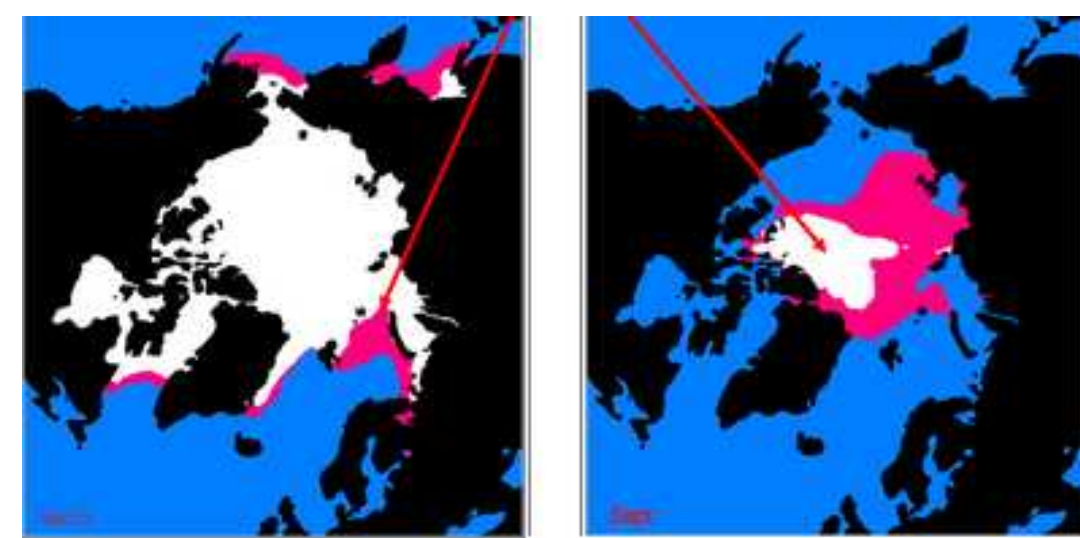


ICEMON Context

An important role of all GMES projects is to define the future products and services that will be to the benefit of the European citizen and the rest of the world. To be able to assess the benefit and products ICEMON have identified the current and future policy areas that are the driving force behind future requirements.

Climate and Environment

One of the most significant aspects of climate change is the enhanced warming and the reduction of the sea ice cover in the Arctic. This development is confirmed by observations over the last decades as well as model simulations. Reduction of sea ice, higher temperatures and more precipitation will have severe consequences for many ecosystems.



Predicted reduction of Arctic sea ice cover 2070 in March and September (white areas)²

Human activities such as resource exploitation, transport, tourism can have severe impact on a vulnerable environment through pollution, disturbance of ecosystems.



Marine mammals depending on sea ice are endangered if the sea ice areas change

Image courtesy : Harvey Goodwin

Better long term climatic data sets for the Arctic, including sea ice data, are required to validate and improve the climate model predictions for the high latitudes. For monitoring of the environment more detailed ice information is needed to understand the links between the physical environment, especially sea ice, and the ecosystems, i.e. polar bears and seals.

Safety and Resource management

"We have agreed to participate in the program of the European Space Agency that will allow us and our customers to evaluate the usefulness of receiving satellite observations of the ice-metocean parameters for ships and offshore structures. Use of the Formal Safety Assessment (FSA) methodology in rule development and the gradually adopted 1st principle approaches requires more accurate data where uncertainties involved need to be specified. The information which is expected to be provided by the ICEMON project is of great importance."

Dr. Carl Arne Carlsen, Senior Vice President, Head of DNV Research

Offshore oil and gas production, fisheries, aquaculture and timber/paper are among the most important industries in the high-latitude seas of Europe including Russia. The changing conditions of the weather and sea in these areas, and the dynamic nature and extent of sea ice makes it important to look at safety regulations for sea transport, marine operations certification of ships and construction of offshore installations. And during daily operations these applications are major users of sea ice, meteorological and oceanographical information in the target areas. ICEMON will improve the access to high quality near real time and statistical sea ice data and include met-ocean information in the products.



Left image shows the cruiseship Hanseatic stranded in Murchisonfjorden, Juli 1997. Transport of tourists/oil/gas and goods, and management of oil/gas reserves will increase substantially the coming years in the European and Russian Arctic

Left image courtesy : Bjrn Frantzen. Right image courtesy: Sea Ice and DNV, Sea Ice information and safety regulations for ships and marine operation by Hessen F.M. et al May 6, 2003

¹E-mail : T. S-Andreassen (tommya@met.no), Stein Sandven (stein@nersc.no), ICEMON Project Manager: Helge Tangen (helge.tangen@met.no)

²Bergen Climate Model for simulation of the IPCC scenario of doubling of CO2 emission into the atmosphere (white areas) and the control run (red areas): a) Winter ice extent (March); b) summer ice extent (September). Courtesy: NERSC.