

COPERNICUS MARINE 8th GENERAL ASSEMBLY

Disko Bay ocean and ice forecast (DIO)

Till Rasmussen, Mia Nørholm, Imke Sievers
and Mads Ribergaard

Danish Meteorological Institute



Danish Meteorological Institute



PROGRAMME OF
THE EUROPEAN UNION



Copernicus
Marine Service

implemented by



MERCATOR
OCEAN
INTERNATIONAL

Motivation



- Waters around Greenland are important infrastructure
- Maritime users often work near the coast
- There are large variations in ice conditions around Greenland
- Ice is an important hazard and opportunity
- It is expected that the number of cruise ships will increase
- Fisheries is an important income, thus the physical conditions are important



● Consortium – introduction to DMI

- The Danish Meteorological Institute (DMI) is responsible for the Greenlandic ice service
- Produces sea ice, ocean and weather information for the Greenlandic waters
- Primary goals:
 - *Safety at sea*
 - *Support security around Greenland*
- DMI contributes to the Copernicus marine services (relevant to the Arctic):
 - *Sea ice (ice charts – manual and automated)*
 - *Iceberg detections*
 - *Sea surface temperatures*
 - *Arctic MFC*

The service

DIO aim at producing high resolution (750m) short term forecast for the Disko Bay ocean and sea

Active area for fishing, shipping and tourism

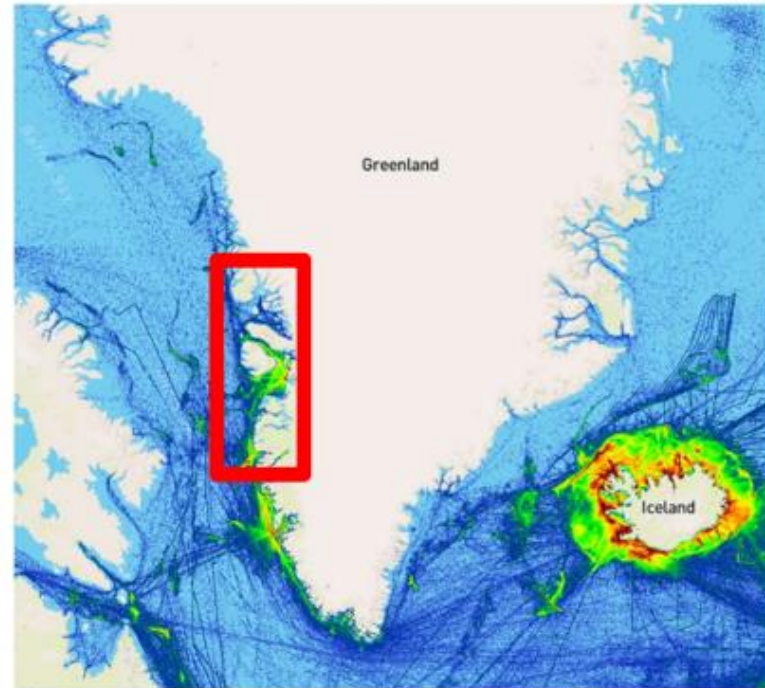
Sea ice free in summer

Partly ice covered in winter

Forecast for 2 ½ days of physical ocean and sea ice parameters

Based on a HYCOM-CICE model system

Forced by DMI Harmonie model

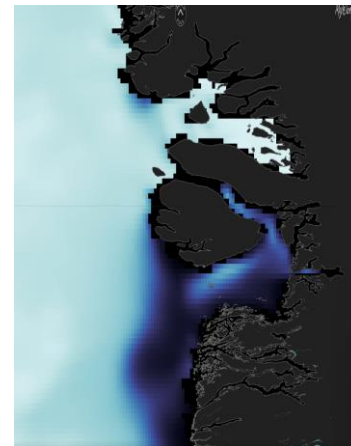


Location of Disko Bay

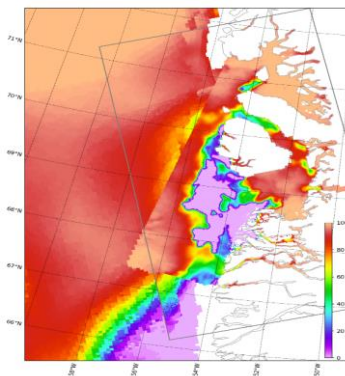
Copernicus Marine service products used

- Boundary conditions
 - Arctic Marine forecast
- Assimilation of sea ice and SST
 - Ice charts Greenland
 - Automated ice charts Greenland
 - Similar Pan Arctic are launched in November
- Validation
 - Primarily Copernicus remotely sensed data
- Wish
 - Higher frequent boundary conditions
 - Level 2 (none gridded) data from remotely sensed observations

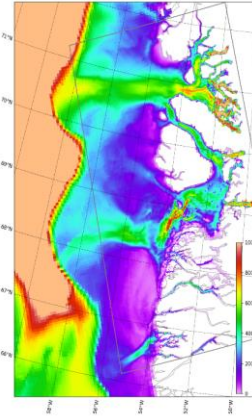
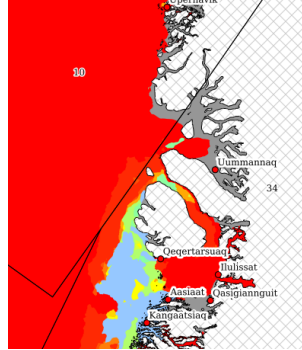
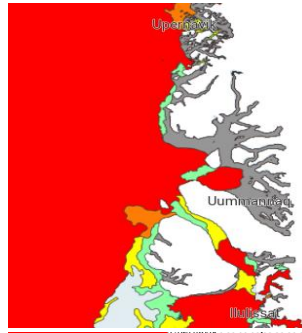
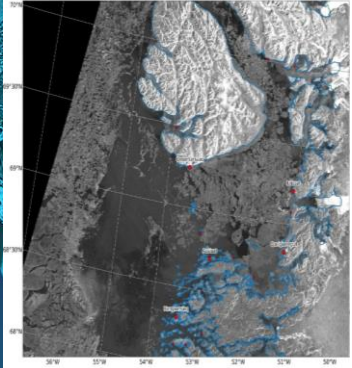
Arc MFC from viewer



Ice cover from OSISAF and ASIP



Use case 1 - ice service



Ice service has traditionally used remotely sensed products

The ice service act as a connection to external users at DMI

At the same time the ice service products serve as assimilation and verification

Feeds into the e.g. Royal Arctic Line, the Navy and piloting services

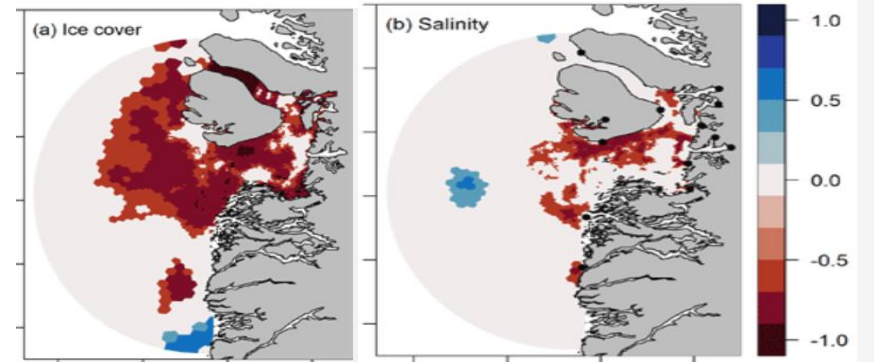
Use case 2 – Aarhus University: Eco system modelling

Aarhus University and other stake holders are interested in the ice cover and the state of the ocean in order to monitor the state of the ocean

Aarhus runs a eco system model that requires boundary conditions

Large scale Copernicus Marine forecasting systems are too coarse

DIO aim at improving this within the Disko Bay area



Correlation between ice cover/salinity
and primary production

Møller, E. F. and Christensen, A. and Larsen, J. and Mankoff, K. D. and Ribergaard, M. cover; Ocean Science; 2023;403-420;10.5194/os-19-403-202H., Sejr, M. and Wallhead, P. and Maar, M.;