

Project information

Keywords

Arctic Ocean; Sea Ice; Ecosystem; Modelling;

Project title

Mesoscale modeling of Ice, Ocean and Ecology of the Arctic Ocean (ModOIE)

Year

2015

Project leader

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Participants

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Ingrid Ellingsen and Morten Alver, (SINTEF Fisheries and Aquaculture AS, SINTEF).

Flagship

Arctic Ocean

Funding Source

Funding from Fram Centre 2015: 1750 kNOK.

Summary of Results

Analysis of existing model simulations have been carried out and lead to scientific publication at various stages (see below for details).

Coupling of the ROMS-CICE system (MetROMS) is nearly finalized and initial tests on different super-computing facilities are promising. The aim is to perform new 4 km and 20 km multiyear simulation to assess the influence of the improved representation of sea ice in the model setup. For this purpose further testing and tuning of the ocean component has been carried out, in order to minimize biases and assure realism of the simulations.

Coupling of the SIMOD ecosystem module with the MetROMS setup has advanced and SINTEF is in the process of testing the new implementation and evaluating the model performance. The next step will be coupling of the ice algae model with CICE and ROMS-SINMOD, and this work will be started in early October.

Synergies were utilized in various initiatives that build on earlier achievements on setting up the A4 and S800 models within the ModOIE project, including proposition and acquisition of several interdisciplinary NFR, Fram Centre and privately financed projects.

For the Management

Although we are satisfied with progress of the project, it should be noted that internal investments of individual project partners have been substantial for reaching some of the outlined project goals. In particular work on model coupling and sound scientific publication was found to consume more time than could be afforded by the project. The impression from this experience is that the financial frame within which multiple Fram Centre partners shall collaborate is tight for ambitious initiatives and fully self-sustained projects.

Published Results/Planned Publications

Isachsen, P. E. (2015), *Baroclinic instability and the mesoscale eddy field around the Lofoten Basin*, *J. Geophys. Res. Oceans*, 120, 2884–2903, doi:[10.1002/2014JC010448](https://doi.org/10.1002/2014JC010448).

Hattermann, T., Isachsen, P. E., vonAppen, W.-J., Albretsen, J., Sundfjord, A., Eddy driven recirculation of Atlantic Water in Fram Strait, *Geophysical Research Letters*, (to be submitted before 01.11.2015)

vonAppen, W.-J., Schauer, U., **Hattermann, T.**, Beszczynska-Möller, A., Seasonal cycle of mesoscale instability of the West Spitsbergen Current, *Journal of Physical Oceanography*, (in prep.)

Harden, B. E., Pickart, R. S., Valdimarsson, H., Richards, C., Våge, K., deSteur, L., Bahra, F., Torres, D., **Børve, E.**, Jónsson, S., Macrander, A., Østerhus, S., Håvik, L., **Hattermann, T.**, Upstream Sources of the Denmark Strait Overflow: Observations from a High-Resolution Mooring Array, *Deep Sea Research: Part I*, (submitted)

ModOIE funded contributing authors **in bold**

Communicated Results

Hattermann & Sundfjord, Project description and highlight, Fram Forum 2015. Communication and exchange of model setup and results on personal basis with international collaborators at the Alfred Wegener Institute in Bremerhaven, Germany and the Climate Change Research Centre, University of New South Wales, Sydney, Australia, as well as advertisement of the newly developed MetROMS system within the ROMS modelling community.

Interdisciplinary Cooperation

The coupling work of CICE and ROMS lead to intense exchange between oceanographers at APN and sea ice experts at MET NORWAY with promising results ahead. The coupling work of MetROMS and SINMOD has lead to intense exchange between oceanographers at APN and ecosystem modellers at SINTEF with promising results ahead. The interaction with other Fram Centre (ArktisMod) and funded (Arctic ABC, UiT) and proposed (HARPHABIT, IMR) NFR projects has further lead to fruitful exchange between oceanography, sea ice and biogeochemical and ecological scientists.

Budget in accordance to results

As indicated was supplementary internal financing used to accomplish some of the project's goals.

Could results from the project be subject for any commercial utilization

Yes

If Yes

The modelling tools being developed in this project bear great potential for commercial utilizations, for e.g. sea ice forecasting, as well as for the assessment of environmental impacts of industrial activity in the Arctic Ocean and around Svalbard, with negotiations between individual project participants and industry partners on-going.

Conclusions

For the current project year, the following objectives had been outlined:

O1.1: Tuning and testing of coupled CICE-ROMS (MET, APN)

O1.2: Preparing coupled multiyear simulations (APN, MET)

O2.1: Comparing Arctic-4km ecology with SINMOD (SINTEF, APN)

O2.2: Integration and testing of sea ice algae model (SINTEF, MET)

O4: Writing scientific paper (MET, APN)

With the current progress, it is likely that all objectives will be met by the end of the project year.