

Project information

Keywords

Fjord circulation, glacier fronts, Atlantic water

Project title

Effects of oceanic inflow and glacial runoff on fjord circulation in Kongsfjorden, Svalbard; establishment of a high resolution ocean circulation model system (KongHiro)

Year

2015

Project leader

Arild Sundfjord

Participants

Norwegian Polar Institute

Institute of Marine Research

University Centre in Svalbard

Flagship

Fjord and Coast

Funding Source

Fram Centre and IMR internal funding

Summary of Results

In phase I (2014) a high resolution (160 m) hydrodynamic numerical model setup of ROMS for Kongsfjorden, was established and initial simulations performed for the period 2005-2010 - a period where good observational data sets are available for evaluation of the model performance. In phase II (2015) the model's representation of fjord exchanges - AW inflow in particular - was compared with statistics based on available data from available mooring time series. Model hydrography was compared with data from moored instruments and from annual cruises; fresh water height, potential energy anomaly and mixed layer depth. Sea ice area and thickness was evaluated against data from the NPI sea ice monitoring series. The validation showed that the model reproduced the main characteristics, including seasonality and variability, of hydrography, currents and sea ice realistically when the new runoff data from the glaciers were used as input data.

For the Management

A new fjord circulation model for Kongsfjorden has been established and tested. The model can be used to study fjord dynamics in the present and future climate states, and coupled with ecosystem and biogeochemical models to investigate e.g. local responses to regional changes.

Published Results/Planned Publications

Glacier runoff, surface layer dynamics and Atlantic Water exchange in Kongsfjorden, Svalbard; model results. Manuscript in preparation, to be submitted for peer-review in Dec 2015 or Jan 2016.

Communicated Results

Results from the first phases have been presented at several meetings:
Norwegian-British Workshop on Arctic Marine Science, Tromsø, June 2014.

Etatslederkonferansen (Ministry of Climate and Environment), Tromsø, September 2014.

Kongsfjorden Monitoring Workshop, Tromsø, January 2015

Interdisciplinary Cooperation

A proposal building on the Konghiro project was submitted to and funded by the Norwegian Research Council in 2015. This project expands the present one to include an ecosystem model to allow for assessment of ecosystem responses to future changes to the physical system in Kongsfjorden.

For 2016 we plan to expand collaboration with the Ocean Acidification flagship and use model results to enhance the value of observations made by an OA flagship project in Kongsfjorden.

Budget in accordance to results

Yes.

Could results from the project be subject for any commercial utilization

No

Conclusions

We are satisfied with the work done in 2015 and look forward to continuing work in 2016.