

Project information

Project title

Marine base maps for the Porsanger Fjord

Year

2012/2013

Project leader

Aivo Lepland, NGU

Participants

- Project leader(s)/institutions: Aivo Lepland , Geological Survey of Norway (NGU)
- Project participants/institutions: Sigrid Elvenes, Oddvar Longva, Liv Plassen, Henning Jensen NGU
- Collaborating scientists/institutions: Einar Eythorsson NIKU, Michael Carroll, Sabine Cochrane APN– active collaboration yet to be established; expected during 2013 as NGU will make produced base maps and results of sediment core studies available to the partners/collaborators in the flagship

Flagship

Fjord and Coast, Theme: Structure, function and change in Arctic and boreal fjord systems

Funding Source

2012 budget: total 1 100 000 including 550 000,- from the Fram Centre and 550 000,- from the NGU

Summary of Results

1. Statens Kartverk Sjø had during their cruise in 2000 obtained a backscatter dataset from the southern part of the Porsanger Fjord. This dataset had not been used and processed before, but in the frame of this project the dataset has now been processed, and is made available for interpreting the seabed character. Using these newly processed, previously existing data in combination with new results of WASSP 80 kHz multi-beam system and ground truthing of the seabed (video, sediment samples) seabed maps can be made for the southern part of the Porsanger Fjord.
2. A ten-day-long mapping cruise in the Porsanger Fjord using NGU's research vessel "Seisma" was undertaken in June 2012. The innermost part of the fjord was a primary mapping target during the cruise because no multi-beam echo-sounder data had been collected from that area before. The obtained bathymetric and backscatter datasets using WASSP 80 kHz multi-beam system, integrated with the results of sediment sampling and video observation of the seafloor have allowed the production of seabed map for the area.
3. Short, up to 60 cm long sediment cores were obtained for environmental studies from depositional basins in the southern Porsanger Fjord during the cruise. Geochemical and isotopic fingerprints archived in these short cores are expected to record environmental and climatic changes during the last c. 100-200 years, and can be used for identifying baseline conditions in the area. The analyses of these cores are under way, and the age dated stratigraphic profiles and assessments of recent changes are expected to get published in 2013-2014.





Figure: (Top) Processed color-coded backscatter data for the southern part of the Porsanger Fjord. These data combined with the bathymetric information, sediment data and visual seabed inspection are used in production of base maps; (Bottom) Simplified sediment map for the innermost part of the Porsanger Fjord with positions sediment samples and video lines.

Published Results/Planned Publications

Given that the Porsanger Fjord base map project is still in the data collection/analyses phase with large areas still to be mapped during 2013 field season, we have not been able yet to be publish any papers and present the results at meetings. The publishing activity is however expected to take off shortly as we plan to web-publish first seabed maps for the southern part of the Porsanger Fjord during the first half of 2013.

Communicated Results

Results of the project will be reported as web-map-services, news items on the web, meeting contributions and scientific papers. Thus far no results have been communicated.

Interdisciplinary Cooperation

The project has had an ambition of collaborating with other projects of the flag ship and integrating the base maps into biological, ecological and social science projects. Cooperative work with other projects is still in infancy, but is expected to develop in 2013 as the maps and sediment data will be made available for partners. Cooperation with the following projects in the flag ship is considered. (i) "Documentation and use of local/traditional ecological knowledge (LEK) on ecological change, climate change, resource use and cultural environments in fjord and coastal areas", project leader Einar Eythorsson. Historic records indicate the geographic change of the fishing sites in the Porsanger Fjord, which underlying causes are apparently determined by changes of the physical environment, assessed by our mapping project. (ii) "Climate and mussels", project leader Michael Carroll. Past environmental and climatic changes can be studied by

using a variety of age constrained proxy records including mussel growth rings and sediment core profiles. (iii) "Benthic biodiversity and ecosystem function in Svalbard and North Norway" project leaders Lis Lindal Jørgensen, Kari Ellingsen and Sabine Cochrane. Benthic communities and biodiversity are largely determined by the physical environment, most importantly the sediment type occurring at the seabed. Sharing of seabed materials between parallel projects provides basis for comparison of biologic and geologic seabed data, and compilation of most reliable seabed maps.

Budget in accordance to results

The funding from the Fram Centre was essential for the NGU to initiate the seabed mapping project in the Porsanger Fjord. Considering that NGU sees environmentally diverse Porsanger Frord as an important fjord for scientific interdisciplinary studies of the Arctic ecosystem, a 50% matching funding from NGUs own resources was secured for the project. The proposed budget for 2012 experienced however a significant cut (750 000,- was applied from the Fram Centre, but 550 00,- was granted), which hindered the fulfillment of the mapping program envisioned for 2012. NGU hopes that the Fram Centre will find means for funding the activities planned for 2013 in accordance with the proposed budget, which will be crucial for optimal completion of the project.

If Yes

A stress to the physical environment of the fjord ecosystem can be caused by increasing activity of the mining industry in the region and production of large volumes of rock/mineral waste. Submarine disposal of mining waste is considered in several recent mining enterprises. To minimize environmental effects of such putative disposal in the Porsanger Fjord, a thorough knowledge of the physical environment, obtained in the project, is required.

Conclusions

The marine base maps allow the assessment of local and regional scale sedimentary and oceanographic processes in the marine environment and provide a context for interpretation of various types of marine data (biologic, climatic, pollution, human ecology). High resolution marine base maps give the information about the physical conditions that is necessary for the best possible, knowledge-based management of the marine environment. Such maps can be used for various management purposes such as identifying suitable sites for marine infrastructure (submarine cables/pipes, disposal of mining waste, fish farms etc), and defining environmental hotspots.

The project uses modern, high resolution techniques for the seabed mapping including WASSP 80 kHz multibeam system and parametric sub-bottom profiler Topas PS 40. Acoustic seabed data are verified and calibrated using sediment samples and seabed video recordings. NGU has a good track record of internet publishing of marine geological maps and data (e.g. www.mareano.no and www.ngu.no). These web services that will also be used for publishing the Porsanger fjord maps are under continuous improvement to ease the access to the maps and to make the usage most user-friendly.