

NATIONAL REPORT
NORWAY

Executive Summery

This report gives the summary of the activities and events that has taken place within the Norwegian Hydrographic Service since the last report given at the NHC54 Conference in Reykjavik, April 2010. Some main issues are:

- A new director took up his position in August 2010
- The LEAN methodology has been introduced as a management tool
- The survey activity has achieved the target figures
- The total number of Norwegian ENC's passed 1000 in 2010
- A *Print On Demand* service is operational
- The specifications for a new multibeam data processing tool was finalized
- A project for establishing a model of the Mean Sea Level with reference to the ellipsoid for coastal/inshore waters has commenced
- The multidisciplinary project Mareano has concluded another successful year

1. Hydrographic Office

The director gave notice late 2009 and he left his position in February 2010.
The IHO Yearbook will be updated as soon as a new Director is appointed.

Administrative information:

The present Director, Evert Flier, took up his position in August 2010. The former Director ended his contract in February 2010.

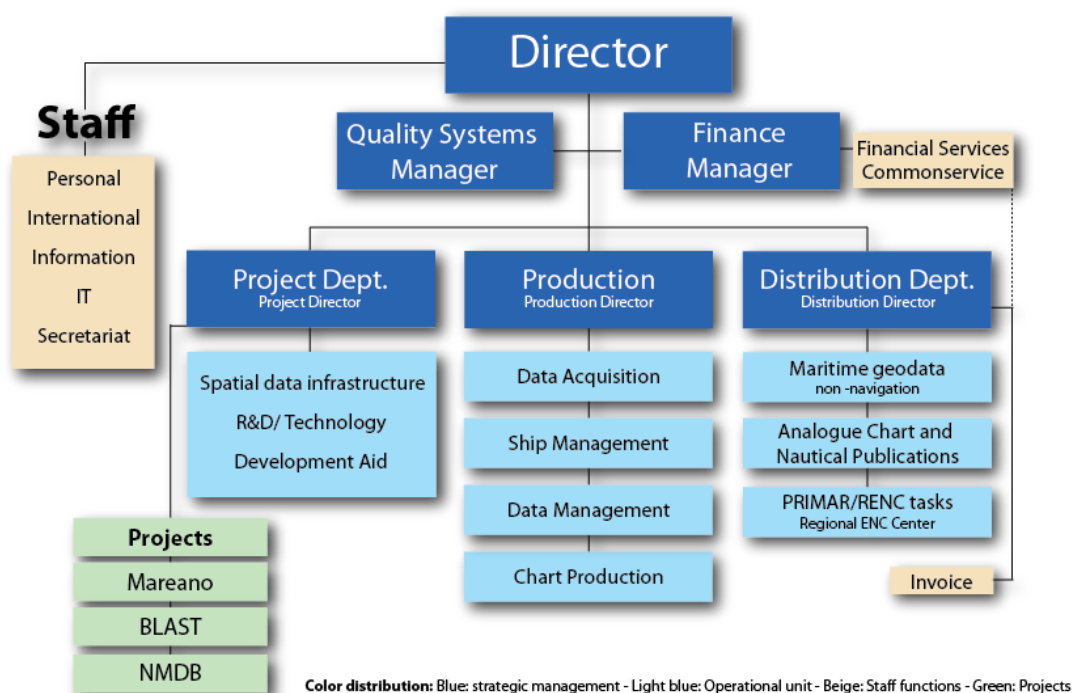


Figure 1. The organisational structure of the Norwegian Hydrographic Service as implemented in 2010.

The main change is the establishment of the Ship Management Department. This department will have the responsibility for survey assets and the crew. The new organization is not necessarily permanent as a solution to outsource the management of crew and technical operation of our survey vessel to the Institute of Marine Research is pending.

In 2010 NHS initiated an internal study with a critical examination on how to carry out data acquisition in the future. A part of this study included visits to some other HOs with recent and relevant experiences in organising survey capacity (Canada, Finland, Sweden and UK). The report has been considered by the top management of the Norwegian Mapping Authority.

Late 2010 the LEAN methodology was introduced as a management tool and philosophy with the purpose of enhancing the productivity. Introductory courses have been arranged for all managers and selected technical experts. A consultancy company has assisted in the preliminary phase of the project.

Total budget for 2011 is NOK 217.3 mill., included expected annual gross revenues of NOK 59 mill for the Distribution Department.

2. Hydrographic Surveys

Internal conducted surveying 2010

During 2010 R/V Hydrograf and its two survey launches have been working in the coastal waters of Norway and Svalbard. In addition R/V Hydrograf also surveyed at open sea for the MAREANO project.

Svalbard

From mid June to the beginning of September R/V Hydrograf surveyed around Svalbard and completed the areas not surveyed on the west coast of Bjørnøya (Bear Island). R/V Hydrograf

surveyed with its EM710 in the deeper parts along with two launches surveyed equipped with EM3002D echo sounders. The surveying in these areas is organised as 7/24 operations and the total area surveyed was 1405km².

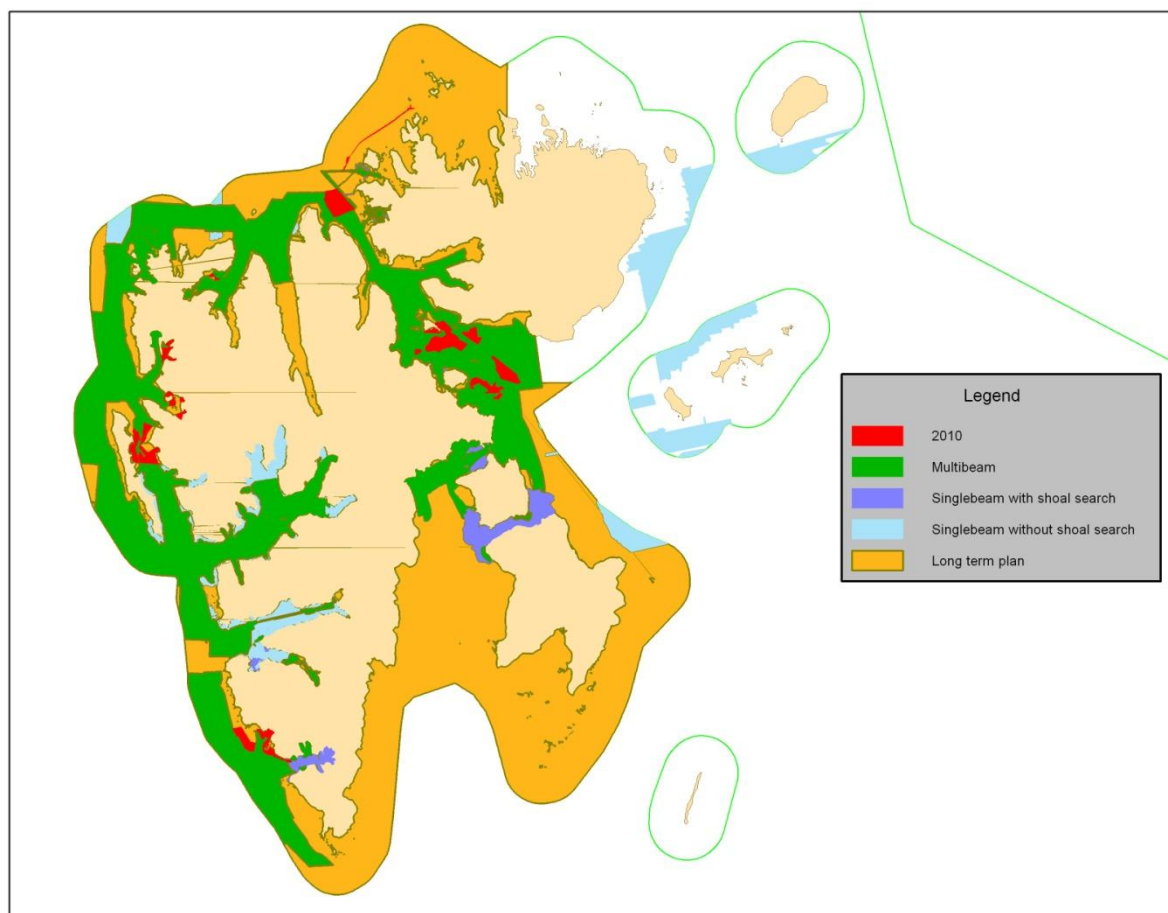


Fig. 2. An overview of the planned and completed surveying around Svalbard.

The MAREANO project (see also item 9)

R/V Hydrograf surveyed about 5 weeks for the MAREANO project and surveyed a total of 2100km². These areas are north of Nordkapp and outside of the southern part of Lofoten (Nordland VI). In addition over 500km² was surveyed during the transit from Svalbard to Bjørnøya.

Norwegian coast

The surveying along the coast has been done with two survey launches equipped with EM3002D and R/V Hydrograf has surveyed some deeper areas with its EM710. The surveying have been organised as 7/12 operations. While R/V Hydrograf surveyed for MAREANO the two survey launches surveyed some harbours (Molde, Kristiansund N, Trondheim and Farsund).

In addition the Tønsberg harbour has been surveyed in cooperation with FFI (Norwegian Defence Research Establishment). NHS provided a hydrographer for the manning of the FFI launch equipped with EM3002D.

The total area surveyed along the Norwegian coast in 2010 was 964km².

External conducted surveying 2010

In 2010 it was FOSAE who was contracted to do the surveying for the MAREANO project. The company surveyed some gaps between previous year's surveys and in addition an area in Nordland VI for a total of 5070km².

For 2011 the Swedish company Marin Mätteknik has been awarded the contract for surveying for MAREANO.

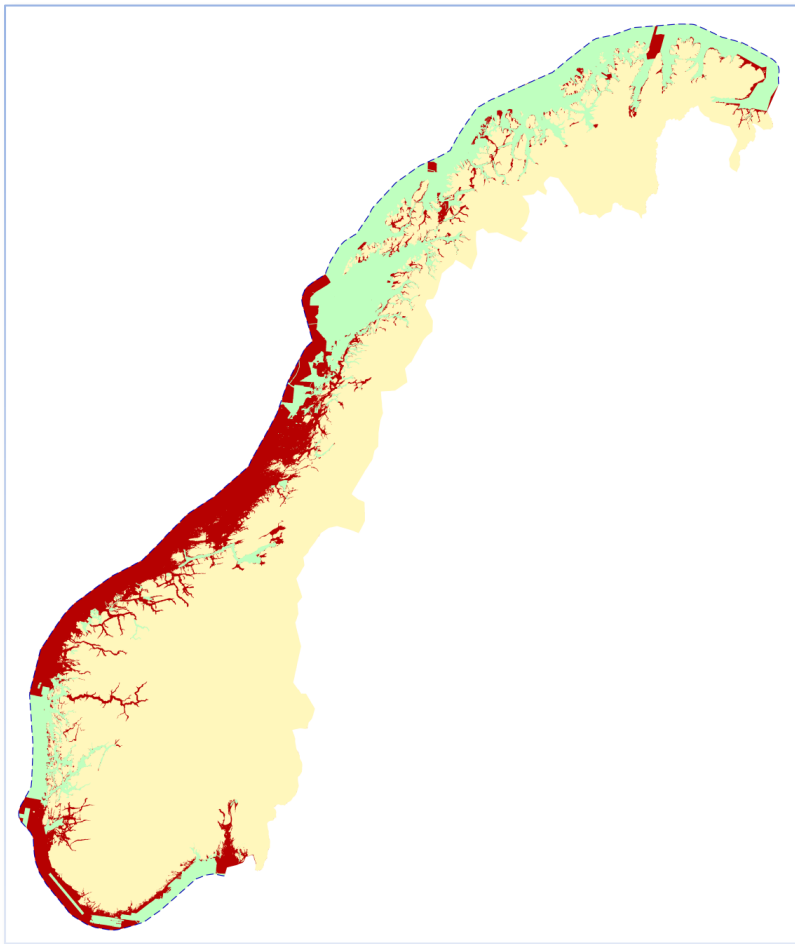


Fig. 4. The total area within the territorial waters (12 nm) on Norway. The red color indicate area NOT surveyed with multibeam.

3. Nautical Charts

3.1. Maritime Primary Database

The Maritime Primary Database consists of selected bathymetry, coastline, shoreline constructions, pontoons, lights and nav aids, submarine cables and pipelines, overheads cables, anchor berthing, marine farms, wrecks and obstructions, restrictions, precautionary area, traffic separation zones etc. The database has full coverage of digital data for the Norwegian coast and the west coast of Svalbard. Some areas are still based on rather old and insufficient survey information. In 2010 the production was aimed on replacing areas with older survey data with new survey data.

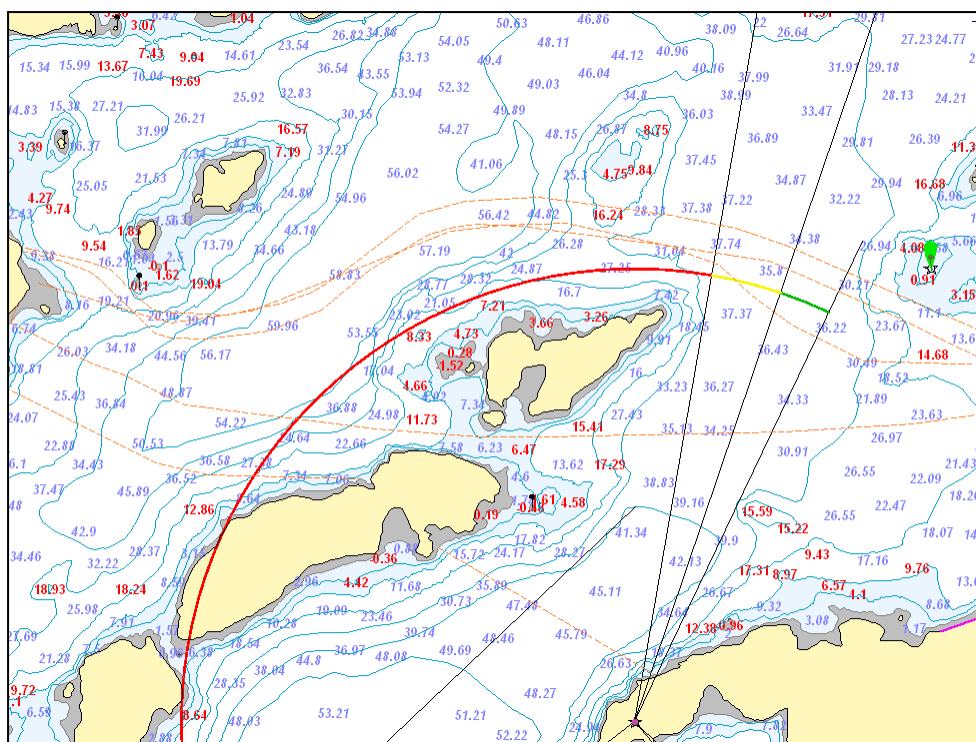


Figure 3. Example of information extracted from the Maritime Primary Database (From Chart 30: outside Ulsteinvik)

The information is organized in an Oracle database and formatted according to S57. The topology is also established according to the S57-format. The data is continuously updated with information from internal and external sources. The production of Notices to Mariners (Etterretninger for sjøfarende) and chart production are based on the information from the Maritime Primary Database. A tracing service has been fully operational during 2010.

The bathymetry, the coastline and shoreline constructions are also available for downloading from the national geospatial infrastructure *Norge Digital*. www.geonorge.no

3.2. Chart production

Since autumn 2008, when the NHS completed the major task of covering the Norwegian coast with ENC's and modernised paper charts, the production is currently concentrating on replacing areas with old survey data (approx 11 000 km²) with new data. The NHS also has the objective to convert the remaining analogue paper charts (57 charts per 31 Dec. 2010) to digital charts. The NHS will outsource some of the production tasks.

A new version of our Chart Plan comprising both surveying and ENC/chart production for the Norwegian coast and the Svalbard area has been prepared for the period 2011 – 2015. Feedback from the users will be of great importance in our yearly review of the chart plan, which is due to take place during spring 2011.

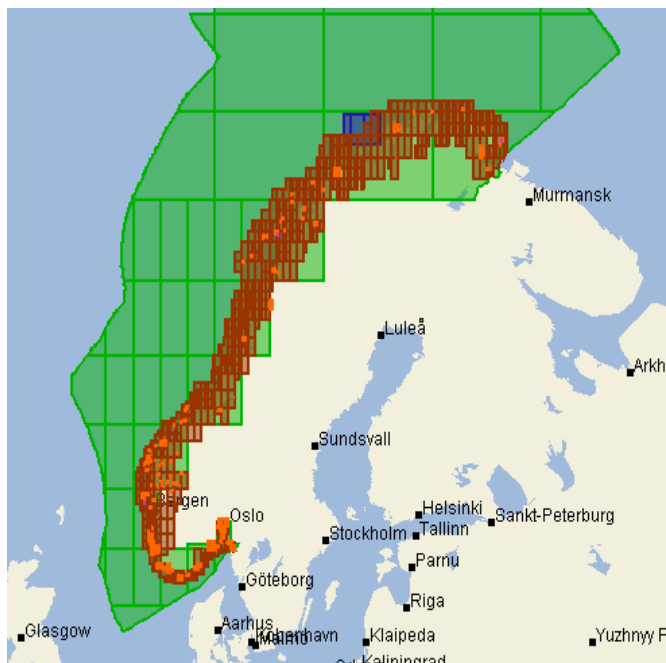


Figure 4 ENC coverage for the Norwegian coastal waters (ENCs in User Band 2-6).

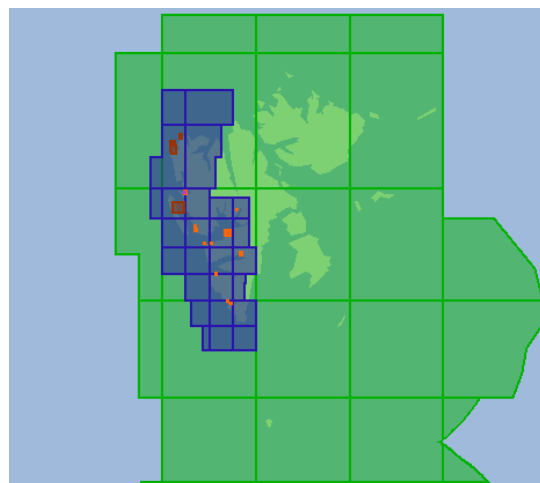


Figure 5. ENC coverage in the Svalbard area (ENCs in User Band 2-6).

3.3. ENC production

In 2010 ENCs equal to 7.75 D-cells (30' x 30') in the Approach and Harbour User Band were produced. In addition 17 new ENCs in General User Band covering the north coast of Svalbard were published, see Figure 5. Also ENC coverage in Berthing and Harbour User Band for 16 insets and several Pilot sketches were produced. The total number of ENCs is currently 1009.

One overview ENC covering the Norwegian Sea (INT 10, INT 100, INT 101, INT 113 and INT 140) was completed and published in January 2010, see Figure 6. The coverage of this ENC was planned to be extended to Svalbard in 2010 but this will be completed in 2011.

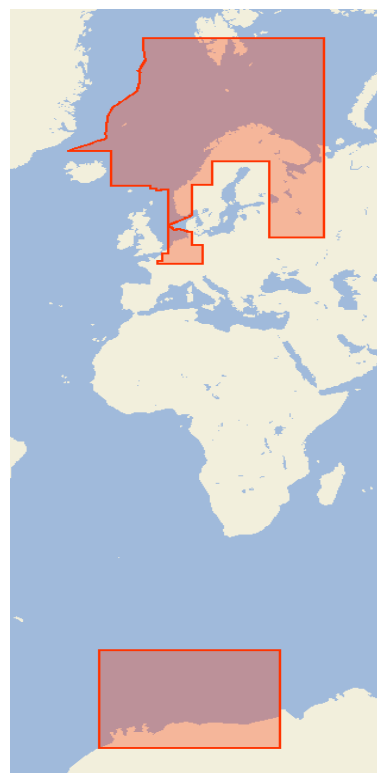


Figure 6.
NO1A3000 Norwegian Sea and
NO1A5500 Queen Maud Land

	Usage Band	Compilation scale	No of ENC's
1	Overview	< 1:1 499 999	2
2	General	1:350 000 – 1:1 499 999	67
3	Coastal	1:90 000 – 1:349 999	30
4	Approach	1:22 000 – 1:89 999	731
5	Harbour	1:4 000 – 1:21 999	167
6	Berthing	> 1: 4 000	12

Table above: Number of ENC's in each usage band

Updating via ER profiles were issued in accordance with the Notices to Mariners and distributed through PRIMAR. A total of 1102 ER files and 57 NE were issued as part of the continuous maintenance of the ENC's.

In connection with the transfer of ENC's to the new chart production system, a review of all ENC's are currently being undertaken in order to improve the quality of the data. New Editions of 159 ENC's were published in 2010 as a result of this task.

Planned activities in 2011:

In 2011 the NHS will continue the production of new harbour ENC's and new editions of existing harbour and approach ENC's where areas with older survey data will be replaced with new survey data. In addition coastal and general ENC's covering the Norwegian chart 306 will be completed. Also ENC's covering chart 305, 307 and 308 are planned in 2011. In addition berthing/harbour ENC's on Svalbard and ENC's covering chart 512 (Jan Mayen), 516 (Bouvetøya) and INT 909 (Antarktis) are planned.

3.4. Paper chart production

In 2010 a total number of 4 harbour charts and 8 main charts were published as new chart or new editions with areas with new survey data.

New charts/ new editions with new survey data published 2010:

Chart No.	Title	Scale
11	Lindesnes – Lista	1:50 000
6	Jomfruland – Risør	1:50 000
13	Nesvåg – Kvassheim	1:50 000
490	Ulvesundet med Måløy hamn	1:10 000
14	Ogna – Tananger	1:50 000
1	Oslofjorden. Færder – Hvaler – Halden	1:50 000
453	Arendal havn	1:20 000
7	Risør – Arendal	1:50 000
8	Arendal – Lillesand	1:50 000
456	Ålesund havn	1:20 000
28	Bremanger	1:50 000
485	Sandnes havn	1:10 000

Revised Reprints published in 2010:

75 charts were revised and reprinted (out of these 71 were updated through our Digital Production Line based on changes in the Primary Database).

Planned activities in 2011

The chart production for 2011 will be focused on production of 8 harbour charts (401, 402, 452, 454, 458, 477, 481 and 484), 3 main charts (4, 10 and 30), one coastal chart (306) and one main chart on Svalbard (523).

We also plan to complete the reconstruction of 5 General charts on Svalbard (505, 506, 507, 514 and 515).

Some of these charts contain much new information and other charts are reconstruction.

3.5. Technology

Print On Demand (POD)

The NHS initiated in 2007 a project with the objective of establishing a Print on Demand service, with technical solution based on the dKart Office technology. Jeppesen has produced a product generator for POD files, delivered august 2010. 28 charts were offered in a test period September 2010. From January 2011 our Main Chart series (143 charts) is offered as POD charts.

Tracings

In 2009 Norconsult was contracted to develop tools for tracings production. The solution is based on Intergraph GeoMedia tools. The flow line was tested and accepted by the NHS late 2009. Tracings service has been in operation in 2010. Due to technical limitations the tracing service support charts with WGS84 Datum only.

The NMDB Project (Norwegian Bathymetric Database)

The NHS has contracted the Dutch company Atlis B.V to provide a new management and distribution system for high resolution bathymetric data, called the Norwegian Bathymetric Database. The development has taken more time than anticipated, but the main components were implemented in 2010. In the autumn 2010 we started the extensive process of transferring data to NMDB, initially from the ocean areas provided by the MAREANO project.

The PLECO Project

The NHS has initiated a project to replace the multibeam processing tool. The specifications were finalized in March 2011 and the tender will be put out in the European market this year. The system is intended to become operational in 2012.

4. Nautical Publications

Volume 1, general information of the “Norwegian Pilot” was published in July 2010.

Volume 7, Svalbard is planned to be published mid 2011.

Notices to Mariners (Etterretning for sjøfarende)

Totally 24 editions were published in 2010. The publication is available both as printed version and in PDF-format for distribution by e-mail. Notice to Mariners is also published on <http://www.statkart.no/efs/>.

As a supplement to the NtM a tracings service was fully operationally from the start of 2010.

5. MSI

The Norwegian Maritime Directorate is the responsible body for MSI in Norway.

6. C-55

Updates of C-55 were sent to IHB in November 2010.

7. Capacity building

We participated in the annual meeting in the IHO Capacity Building Sub-Committee. Norway finalized in March 2011 the specification for a database system for the management of the applications to CBSC.

The Norwegian Agency for Development Cooperation (Norad) has launched a programme called *Oil for development*. NHS is represented in the programme, as subordinate of the Ministry of Environment. So far we have assisted at one cruise in collection of multibeam data from the continental slope of Ghana. Any further assistance to Ghana within hydrography will be decided in the first half of 2011.

8. Oceanographic activities

An oceanographer working on a PhD degree on numerical tidal current models almost finished her thesis (defence of the thesis to take place in May 2011). NHS has the intention to use this competence to improve our products, but we also intend to co-operate with other institutions with skills and capacity within numerical modelling.

The Norwegian Meteorological Institute has delivered a tidal model for the North Sea, the Norwegian Sea and the Barents Sea constituting a 4km grid with tidal heights and currents. The delivery consists of 6 years of simulated data based on an ocean model (ROMS). From these data we have started the work of calculating harmonic tidal constants and finding the Lowest Astronomical Tide (LAT) surface relative to the Mean Sea Level (MSL) surface delivered by the Danish National Space Center.

The project to establish a model of the MSL with reference to the ellipsoid for coastal/inshore waters had its first survey campaign in the summer 2010. This resulted in GPS measurement along with observation from tide gauges from 20 different locations, each series consist of about 2 months of observations. The analysis of these time series has started with the purpose of getting better knowledge about how such measurements should be done (distribution and distance between the sites used).

During the year we added another tide gauge to our permanent network (Mausundvær, west of Trondheim). Totally 24 tide gauge stations are in continuous operation. The data from our tide stations are transferred each hour to our office and published on the internet. Successful data capture for 2010 was close to 99%.

NHS experiences an increased interest in water level data. For instance the data are used in connection with construction activities in coastal areas and in risk management related to flooding.

9. Other activities

9.1. Harmonized coastline for Norway

At present the Norwegian Mapping Authority (NMA) delivers products with different definitions of the coastline. The coastline in today's nautical charts and land maps might be different. This makes it difficult to connect land and sea information. At the same time, it demonstrates that the NMA lacks a common plan for data management and updates. Over a span of many years, different models of coastline data management have been discussed; but, at last, the work to establish a common data management strategy has been completed.

The work of establishing a harmonized coastline database started in May 2009. The harmonized coastline will be a compilation of the coastline from both hydrographic and topologic mapping, where the most accurate and updated data will be chosen, case by case.

The plan is that the NMA's primary harmonized coastline database is to be finished by March 2011. In addition, the goal is to establish a harmonized and generalized coastline, and to plan and implement a common data management for both databases for the whole NMA

9.2. The BLAST project

Bringing Land and Sea Together (BLAST) is the title of the transnational partnership between 16 organisations from six countries in the North Sea region. The Norwegian Hydrographic Service is Lead Partner. The overall aim of the project is to improve maritime safety and coastal zone planning and management – all in the context of climate change. It sets out to harmonise and integrate terrestrial and marine geographical datasets to create a consistent database, and develop planning and visualising tools for the new generation of marine information systems. The project started in October 2009.

BLAST is funded by the European Union as part of the Interreg IVB North Sea Region Programme, which aims to help organizations to co-ordinate regional projects. The three-year project will be completed in 2012. The project's homepage is <http://www.blast-project.eu/>

9.3. The MAREANO Programme

Background: MAREANO is a multidisciplinary marine mapping and documentation programme aiming at providing the foundation for ecosystem based sustainable management of the Norwegian coastal and sea areas. The primary focus has been The Management plan for the Barents Sea (see figure 7 below). The aim is to bridge the knowledge gap in poorly mapped but very sensitive areas. High quality multibeam bathymetry is regarded as a premise for further geological and biological investigations. The NHS is responsible for bathymetric data acquisition, and effective data management and distribution of survey data, derived products and services. An important facet of the programme is the web-based geodata distribution, and distributed data management as part of a National Spatial Geodata Infrastructure (NSDI)

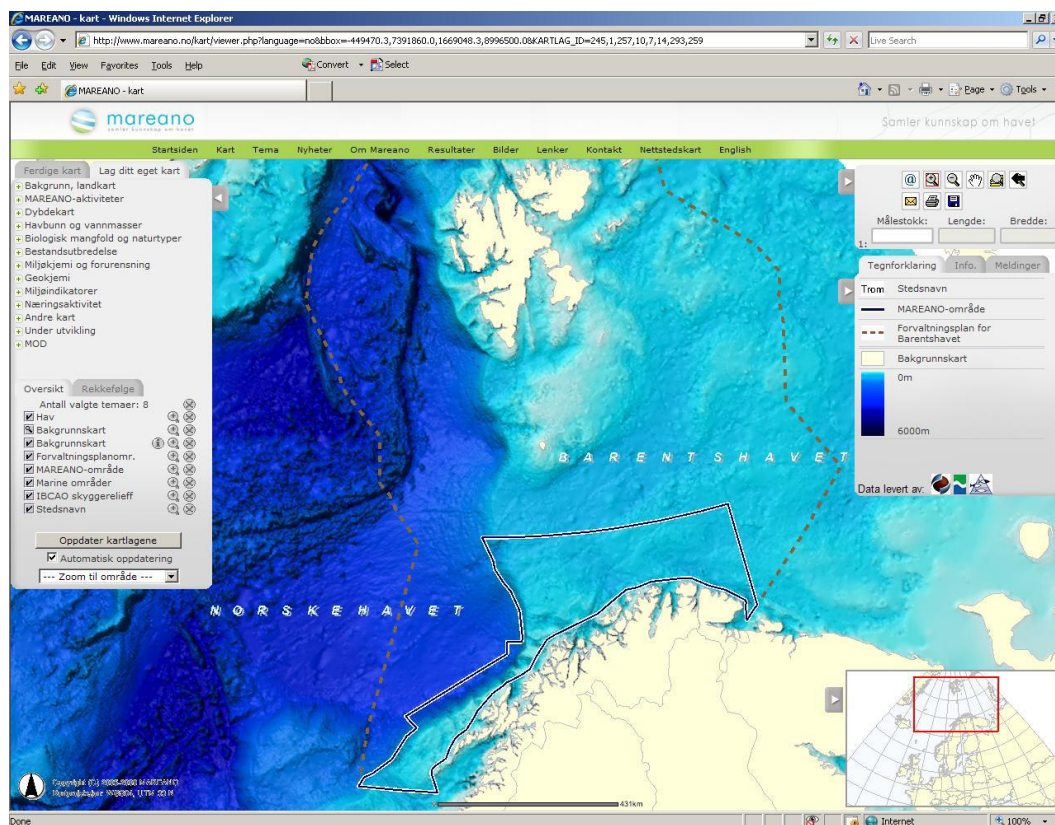


Figure 7. The solid lines indicate the *MAREANO* project area. The stippled lines encircle the area for *The Management plan for the Barents Sea*

Organization: The NHS is a programme partner with the Institute of Marine Research (IMR, programme management) and the Geological Survey of Norway (NGU).

Results 2010: The MAREANO programme received NOK 51.5 mill in total through earmarked funding. NHS received NOK 20.6 mill. 7 069 km² was surveyed in 2010 and 8 060 km² was received from Statoil (measured in 2003). See overview of surveyed areas in figure 8 below.

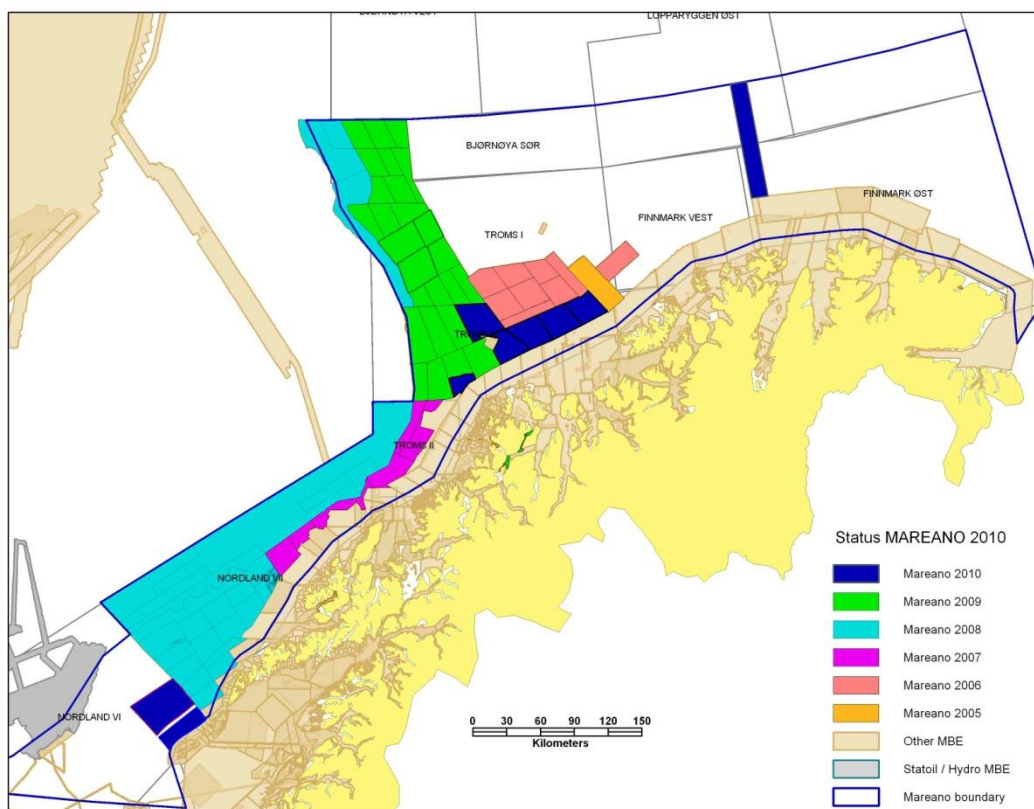


Figure 8. An overview of the surveyed area each year for the period 2005 - 2010

Data distribution: All our multibeam data north of Lofoten has been modeled in grids of various resolutions, and visualized through shaded relief maps as a Web Map Service included in the map services on the MAREANO webpage. Further overview bathymetry map services have been produced, also showing the coverage of all surveys in the NHS data management system. Further information and results is available on www.mareno.no. This website is a portal for knowledge dissemination mainly through effective map services and documentation aimed at both government decision-makers and the general public. The web service is a joint effort among the programme partners, but the project is managed by the Institute of Marine Research.

NSDI: According to the MAREANO data policy all geodata from the MAREANO programme will be published in the Norwegian spatial data infrastructure; *Norge Digitalt*.

MAREANO will be a major undertaking for the NHS in the years to come, and is mainly aimed at non-navigational purposes. The MAREANO concept is planned to be used also for the Management Plan for the Norwegian Sea.

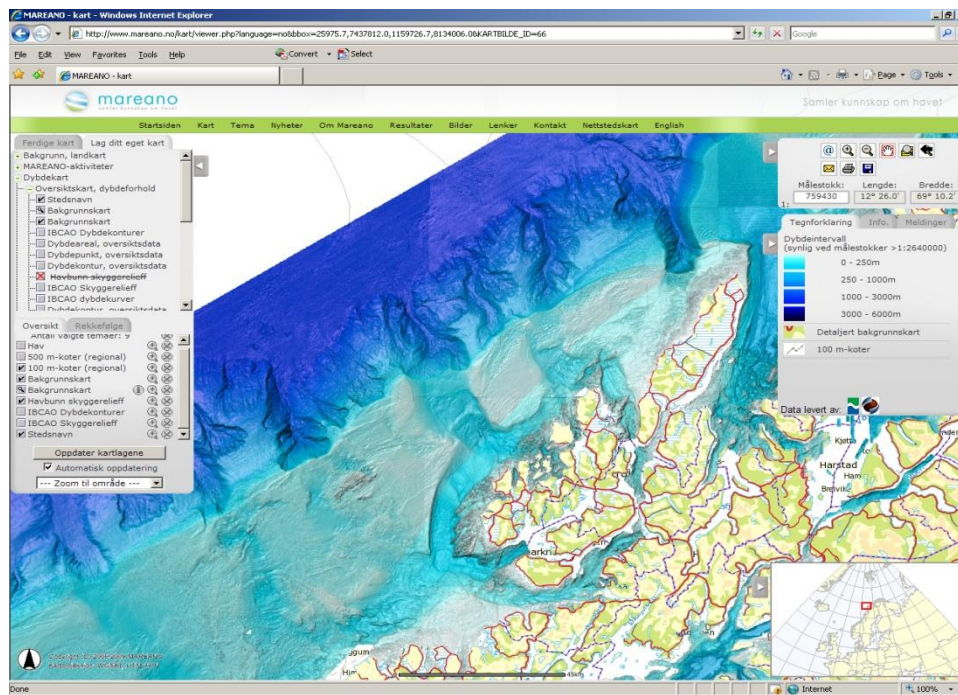


Figure 9. An example from the WMS shadow relief map service showing spectacular submarine canyons and slide scars on the edge of the most narrow part of the Norwegian shelf north of Lofoten and west of Andøya (screendump from map service on www.mareano.no)