Kartverket	NHC 55th Meeting Copenhagen 21-23 May 2012	NHC National Report NORWAY

NATIONAL REPORT
NORWAY

Executive Summery

This report gives the summary of the activities and events that has taken place within the Norwegian Hydrographic Service (NHS) since the last report given at the NHC55 Conference in Stavanger, April 2011. Some main issues are:

- The LEAN methodology has contributed positively to our performance
- The survey activity has exceeded the target figures
- 1045 ENCs produced by the end of 2011
- A *Print On Demand* service has been fully operational since January 2011
- The main elements of the Norwegian Bathymetric Database (NMDB) are operational
- The multidisciplinary project MAREANO has concluded another successful year
- The Blast project has achieved tangible results

1. Hydrographic Office

No substantial change in the organizational structure has taken place since the last meeting. Our premises have been refurbished in 2011.

Late 2010 the LEAN methodology was introduced as a management tool and philosophy with the purpose of enhancing the productivity. The implementation phase of LEAN has resulted in several contributions to our continuous improvement efforts.

Our ISO certificate has been successfully renewed.

NHS has experienced a high turn-over, reflecting the high competition on the labour market in our region.

We have experience a considerable reduction in sales of paper chart. It is hard to find an obvious explanation to this downturn.

Total budget for 2012 is NOK 255.5 mill., included expected annual gross revenues of NOK 60.5 mill for the Distribution Department. The considerable increase in budget compared to 2011 is mainly related to additional grant for the MAREANO project.

2. Hydrographic Surveys

Internal conducted surveying 2011

During 2011 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

R/V Hydrograf surveyed around Svalbard from mid June to the end of September. 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 1722 km^2.

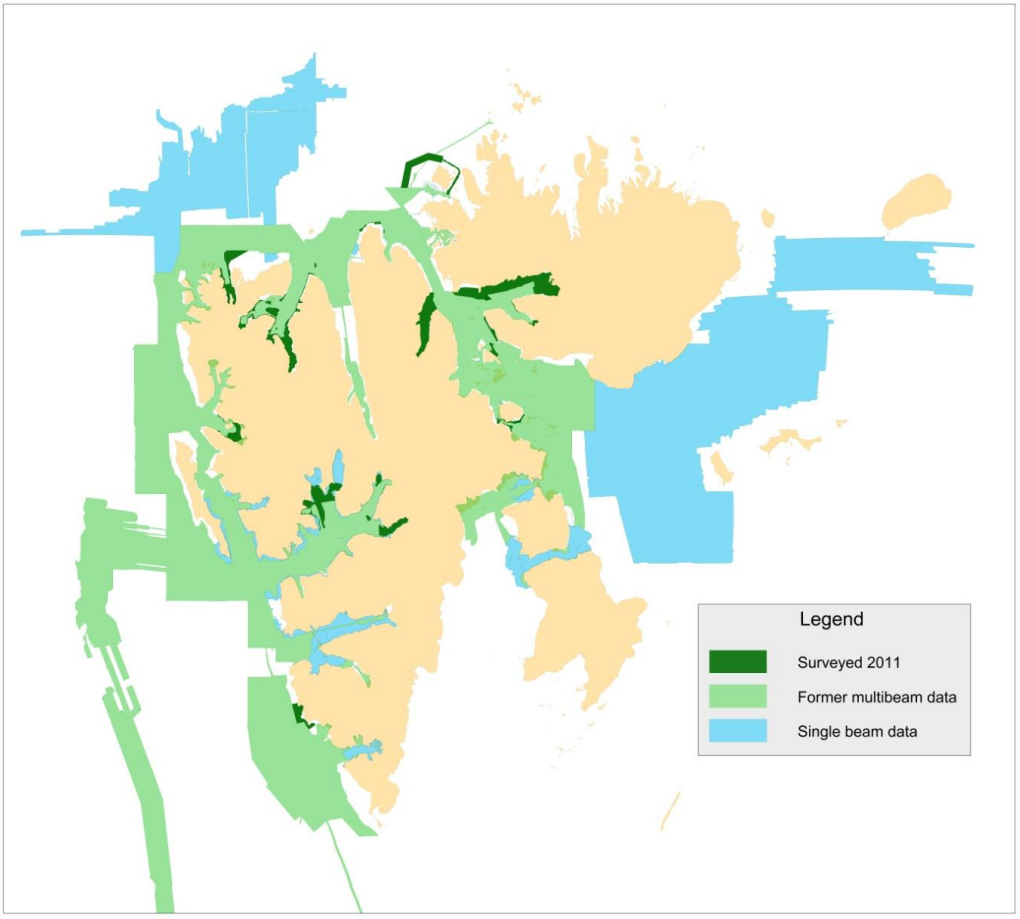

Fig. 1. An overview of the surveyed areas around Svalbard.

The MAREANO project *(see also item 9.3)*

R/V Hydrograf surveyed about 5 weeks for the MAREANO project and surveyed a total of 1711 km². These areas are outside of the southern part of Lofoten (Nordland VI).

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 one survey launch surveyed some harbours and minor areas along the coast of Norway.

In addition the harbour of Sarpsborg and Fredrikstad 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 2011 was 939 km².

External conducted surveying 2011

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

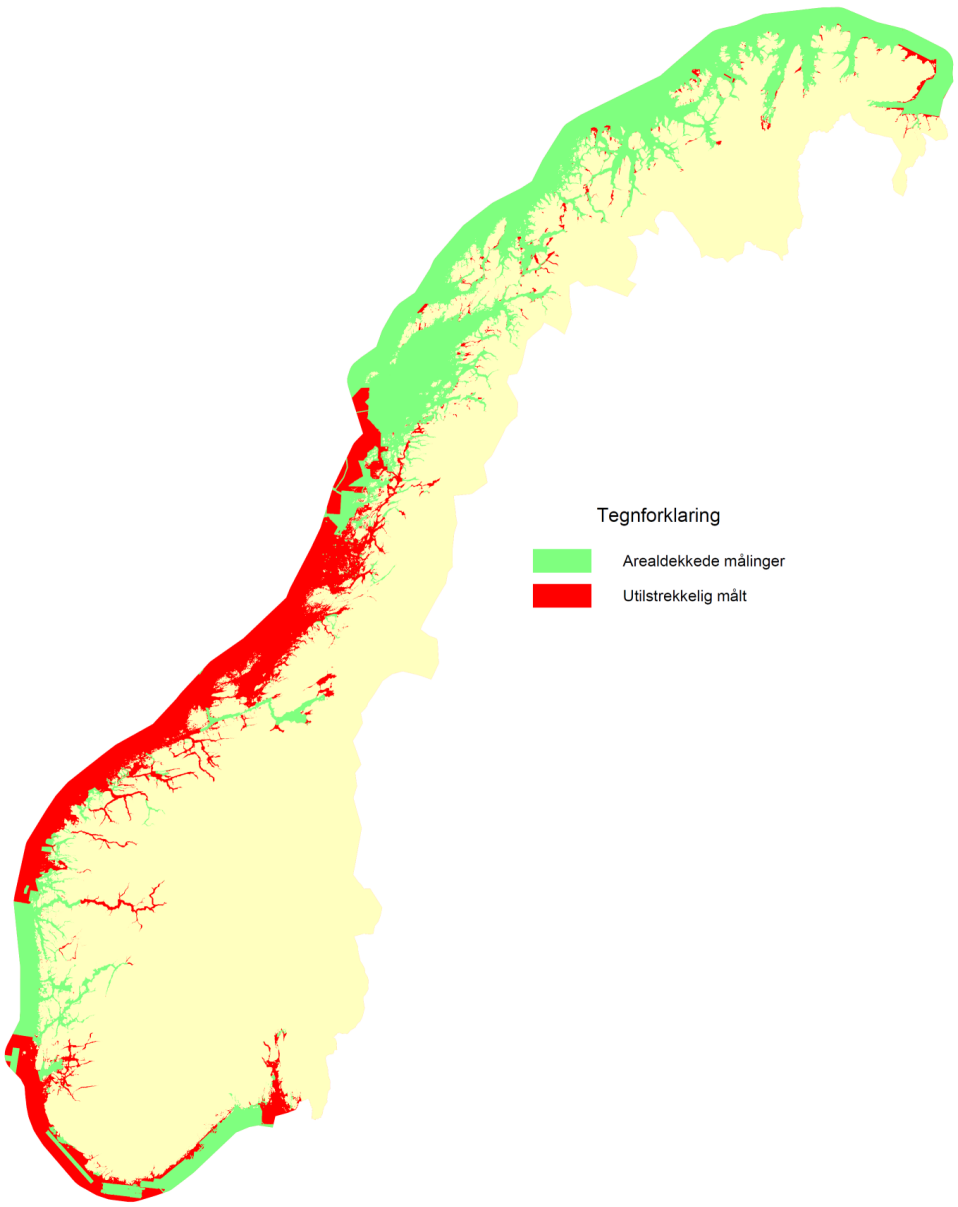

Fig. 2. The total area within the territorial waters (12 nm) of Norway. The red color indicate area NOT surveyed with multibeam.

3. Nautical Charts

3.1. Maritime Primary Database

The Maritime Primary Database consists of selected bathymetry, coastline, shoreline constructions, pontoons, lights and navaids, 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 2011 the production included replacing areas with older survey data with new survey data in selected pilot -sketches at Spitsbergen and three major harbors; Molde, Kristiansund and Trondheim.

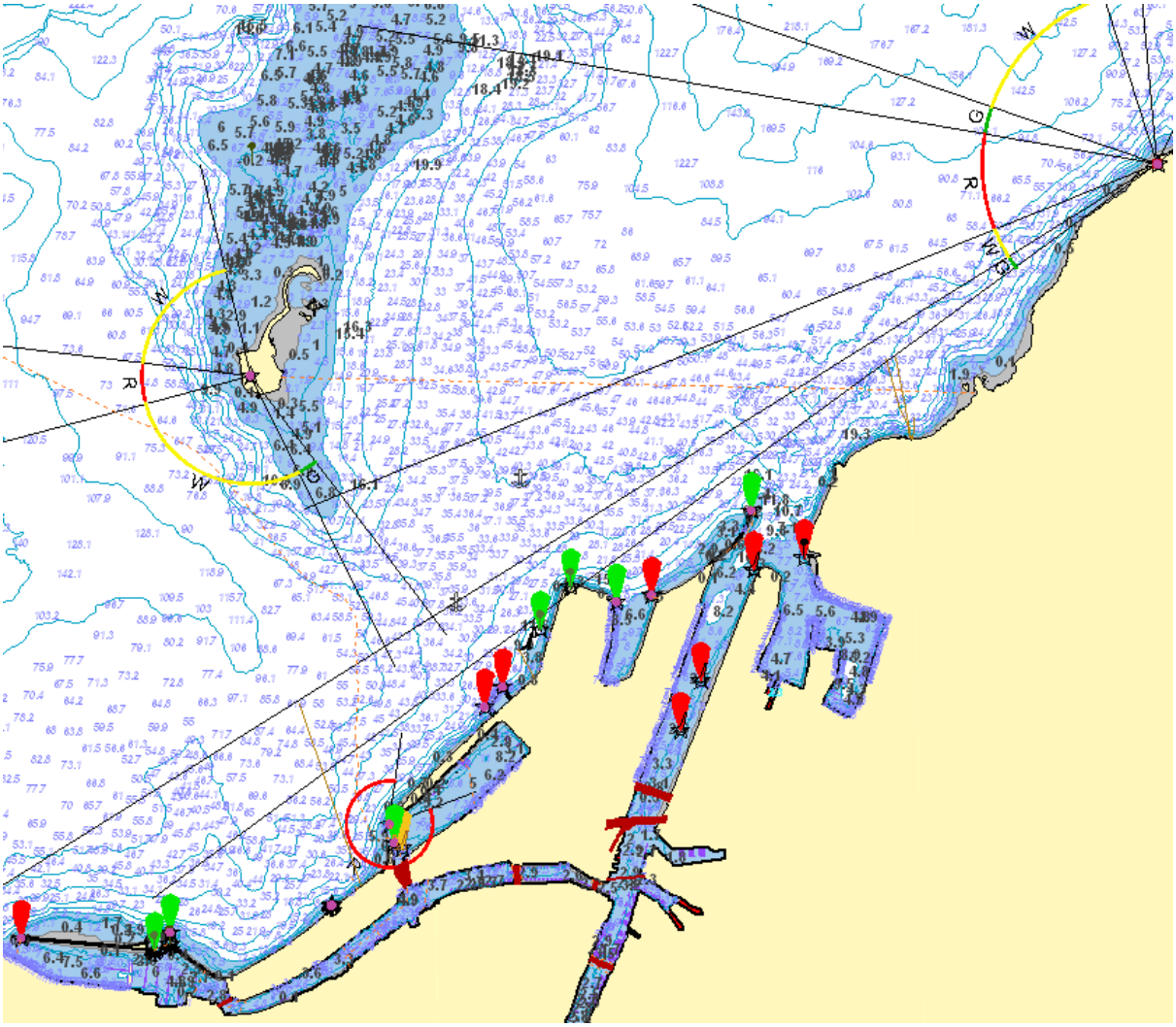

Figure 3. An example of information extracted from the Maritime Primary Database (From Chart 458: Trondheim)

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 all chart/ENC production are based on the information

from the Maritime Primary Database. A tracing service has been fully operationally during 2011.

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

Planned activities in 2012: In 2012 the NHS will continue the process of replacing older survey data with new survey data. Main focus area will be at the east coast of Spitsbergen, selected harbors (Florø and Larvik) and chart 24 (Fensfjorden - Sognesjøen)

3.2. Chart production

Since autumn 2008, when the NHS completed the major task of covering the Norwegian coast with ENCs and modernised paper charts, the production is currently concentrating on replacing areas with old survey data (approx 11 000 km^2) with new data. The NHS also has the objective to convert the remaining analogue paper charts (41 charts per 31 Dec. 2011) to digital charts. The NHS will outsource some of the production tasks.

Our latest version of the Chart Plan comprising both surveying and ENC/chart production for the Norwegian coast and the Svalbard area was prepared for the period 2011 – 2015. Feedback from the users is of great importance when we now (spring 2012) are working on a review of the chart plan (2013-2017).

3.3. ENC production

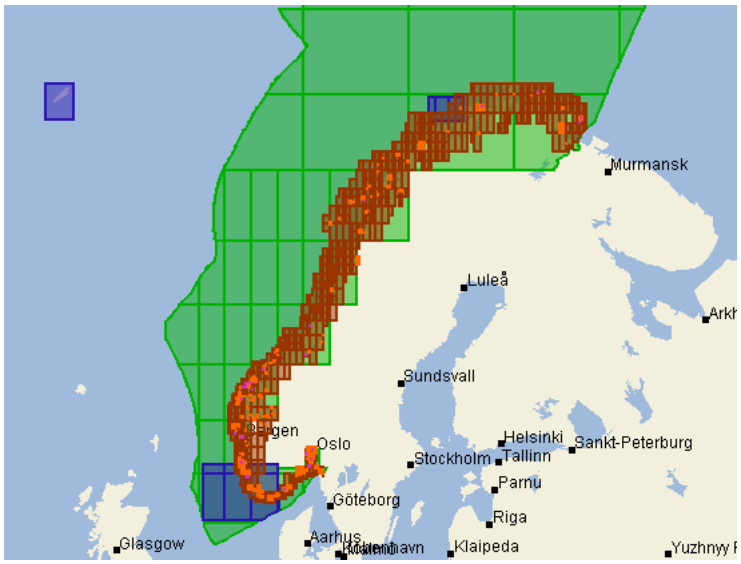

Figure 4. ENC coverage for the Norwegian coastal waters (ENCs in User Band 2-6).

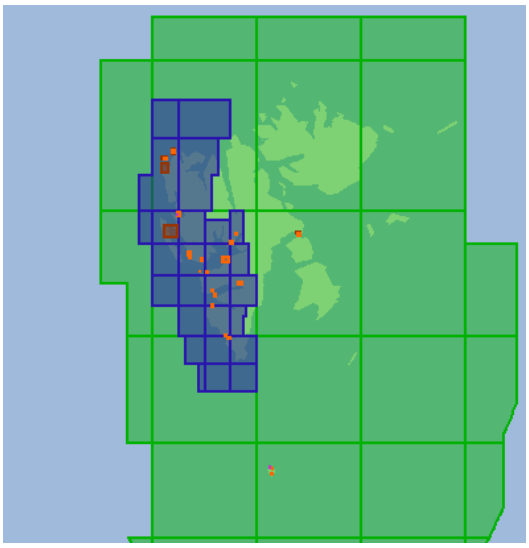

Figure 5. ENC coverage in the Svalbard area (ENCs in User Band 2-6).

In 2011 ENCs equal to 7.75 D-cells (30’ x 30’) in the Approach and Harbour User Band were produced along the Norwegian coast. In addition 7 new ENCs in Coastal User Band in southern Norway were published, see Figure 4. Also 7 existing ENCs in General User Band were upgraded in this connection.

In Svalbard 4 ENCs (30’ x 2°) in Coastal User Band were produced. Also ENC coverage in Approach, Berthing or Harbour User Band for 17 Pilot sketches where published, see Figure 5. In addition ENC coverage in Coastal User Band of Jan Mayen and Approach User Band of Bouvetøya were published. The coverage of our overview ENC covering the Norwegian Sea was extended to Svalbard, see Figure 6. The total number of ENCs was 1045 at the end of 2011.

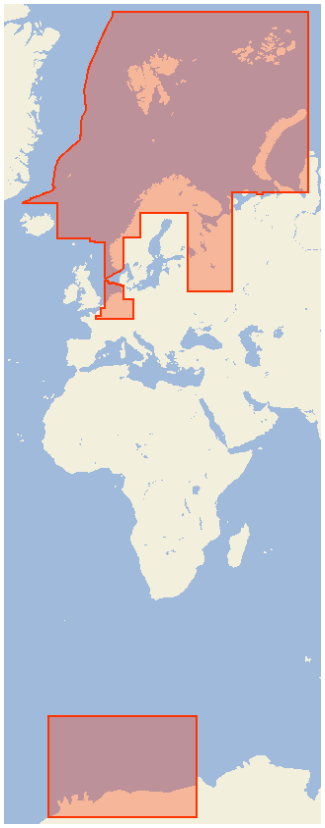

Figure 6.
NO1A3000 Norwegian Sea and
NO1A5500 Queen Maud Land

	Usage Band	Compilation scale	No of ENCs
1	Overview	< 1:1 499 999	2
2	General	1:350 000 – 1:1 499 999	68
3	Coastal	1:90 000 – 1:349 999	38
4	Approach	1:22 000 – 1:89 999	733
5	Harbour	1:4 000 – 1:21 999	181
6	Berthing	> 1: 4 000	23

Table above: Number of ENCs in each usage band per 31 Dec. 2011

Updating via ER profiles were issued in accordance with the Notices to Mariners and distributed through PRIMAR. A total of 1172 ER files and 41 NE were issued as part of the continuous maintenance of the ENCs.

I connection with the transfer of ENCs to the new chart production system, a review of all ENCs are currently being undertaken in order to improve the quality of the data. New Editions of 161 ENCs were published in 2011 as a result of this task.

Planned activities in 2012:

In 2012 the NHS will continue the production of new editions of existing Harbour and Approach ENCs. Areas with older survey data will be replaced with new survey data. In Svalbard and Bjørnøya new Coastal ENCs will be produced. Production of new Coastal ENCs and upgrade of General ENCs covering chart 305 and 307 will be started in 2012, and completed in 2013. Also INT 909 (Antarktis) is planned.

3.4. Paper chart production

In 2011 a total number of 9 harbour charts, 4 main charts and 21 charts in polar areas were published as new chart or new editions with areas with new survey data.

New charts/ new editions with new survey data published 2011:

Chart No.	Title	Scale
4	Oslo – Rødtangen – Drammen	1:50 000
10	Ny-Hellesund – Lindesnes	1:50 000
16	Tananger – Stavanger – Skudenes	1:50 000
116	Sør-Varanger. Bugøynes – Grense Jakobselv	1:50 000
401	Oslo – Spro	1:25 000
402	Spro – Filtvet	1:25 000
452	Oslo havn	1:10 000
470	Singlefjorden, Iddefjorden med Halden havn	1:25 000
477	Farsund havn med innseilinger	1:10 000
481	Åsgårdstrand – Slagentangen	1:10 000
482	Moss havn	1:20 000
484	Molde havn	1:10 000
486	Horten havn	1:10 000
505	Bjørnøya – Isfjorden – Hopen	1:700 000
506	Barentshavet	1:700 000
507	Nordsvalbard	1:700 000
512	Jan Mayen	1:100 000
514	Barentshavet	1:2 000 000
515	Svalbard – Grønland	1:2 000 000
516	Bouvetøya	1:60 000
521	Femtebreen – Gråhuken	1:100 000
522	Forlandsrevet – Femtebreen	1:100 000
523	Isfjorden	1:100 000
524	Prins Karls Forland - Barentsburg	1:100 000
525	Bellsund – Van Mijenfjorden	1:100 000

526	Hornsund	1:100 000
527	Sørkapp	1:100 000
533	Storfjorden. Freemandsundet – Heleysundet – Sørporten	1:100 000
534	Olgastretet. Freemandsundet – Svenskøya	1:100 000
535	Erik Eriksenstretet. Sørporten – Svenskøya	1:100 000
536	Hinlopenstretet S. Sørporten – Svenskøya	1:100 000
537	Hinlopenstretet N. Fosterøyane – Nordporten	1:100 000
539	Norskebanken	1:100 000
540	Hinlopenrenna. Moppen - Lågøya	1:100 000

Revised Reprints published in 2011:
57 charts were revised and reprinted (out of these 45 were updated through our Digital Production Line based on changes in the Primary Database).

Planned activities in 2012
The chart production for 2012 will be focused on production of 4 harbour charts (454, 458, 468 and 472), 8 main charts (3, 4, 14, 16, 36, 39, 128 and 130), one coastal chart (306) and 3 charts in polar areas (501, 533 and 549 [INT 909]).

We also plan to do reconstructions of 5 Harbour charts (455, 466, 469, 470, 471, 478 and 488).

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

3.5. Technology

Print On Demand (POD)
The NHS initiated in 2007 a project with the objective of establishing a Print on Demand service. From January 2011 our Main Chart series (143 charts) was offered as POD charts and from January 2012, 28 Harbour charts were added to the service.

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 during 2010. In the beginning of 2011 we started the extensive process of transferring data to NMDB, initially from the ocean areas provided by the MAREANO project and in the focus areas for producing data to the maritime primary database.

The PLECO Project
The NHS has initiated a project to replace the existing multibeam data processing tool. The tender was published in the European market in 2011, but due to lack of response the tender was revised and re-published early 2012. This will also postpone the start-up of the system until 2013.

Web based versions of Notices to Mariners and the Norwegian Pilot

The NHS has initiated two projects starting the process of making fully operational web based versions of Notices to Mariners and the Norwegian Pilot. A preliminary version of NTM-Web is expected in 2012. The first version of Pilot-Web is expected in 2013. The goal is to replace the paper version of NTM with NTM-Web after the solution has been approved by the Norwegian authorities

4. Nautical Publications

Volume 7, Svalbard was published in August 2011. An English version of volume 7 will be produced in 2012.

Notices to Mariners (Etterretninger for sjøfarende)

Totally 24 editions were published in 2011. 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 is fully operationally.

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 2011.

7. Capacity building

We participated in the annual meeting in the IHO Capacity Building Sub-Committee. Norway finalized in March 2011 the specification for at database system for the management of the applications to CBSC. The development of the system will be effectuated by IHB, but with some assistance from NHS.

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. We were not involved in any practical implementation of any project in 2011. We have assisted Mozambique in preparing an application to the Norwegian embassy, with might end up in a common project.

8. Oceanographic activities

New extreme value analyses for high and low water have been done for all our permanent tide gauges, and levels with return periods of 5, 10, 20, 50, 100 and 200 years will be

published on our web pages. There is an increasing demand for these values, especially from local authorities in connection with coastal zone planning.

Six years of data from a water level model (from the Norwegian Meteorological Institute) have been analysed and we have a 4 km grid with harmonic tidal constants from the North Sea, the Norwegian Sea and the Barents Sea. We are working on a program that will calculate tidal predictions from the model, and plan to make the system available on the internet. The model will also give a LAT surface for the area.

We have, for some time, been working on a methodology to find a MSL-surface relative to the ellipsoid for coastal and inshore waters. We have about 40 short term (1-2 months) water level series and GPS measurements in a relatively dense network. We hope to find a method to investigate the whole coast with measurements in a much coarser network.

We are planning and have done some preparations to install permanent tide gauges on the islands Jan Mayen and Bear Island. Bad weather conditions and transportation make the projects difficult.

New web pages with water level data and -information will be released soon, www.sehavniva.no. The new web-pages will offer more free data than the old one, and the users can ask for data adjusted to other places than the permanent tide gauges with the help of a time delay and a range factor.

9. Other activities

9.2. The BLAST project

The Blast (Bringing Land And Sea Together) project is now in the finishing phase with only 6 out of 36 months left to go.

Until now several tangible results have been achieved in particular on harmonization of topographic and marine data and harmonization of maritime information. The ENC checker and Marine data Collection System (MDCS) prototype are profound examples. The opening of the North Atlantic Information Management Centre in Haugesund also exposed a vital Blast contribution.

The other main topics been addressed are related to Integrated Coastal Zone Management (ICZM). The main work here is to develop web based computation of climate change indicators based on the harmonized land/sea datasets. The indicators will in turn be used by coastal zone planners as a basis for decision making.

See also the project website 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. In 2012 MARANO will also start mapping areas covered by the management plan for the Norwegian 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 (including backscatter and water column data), 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)

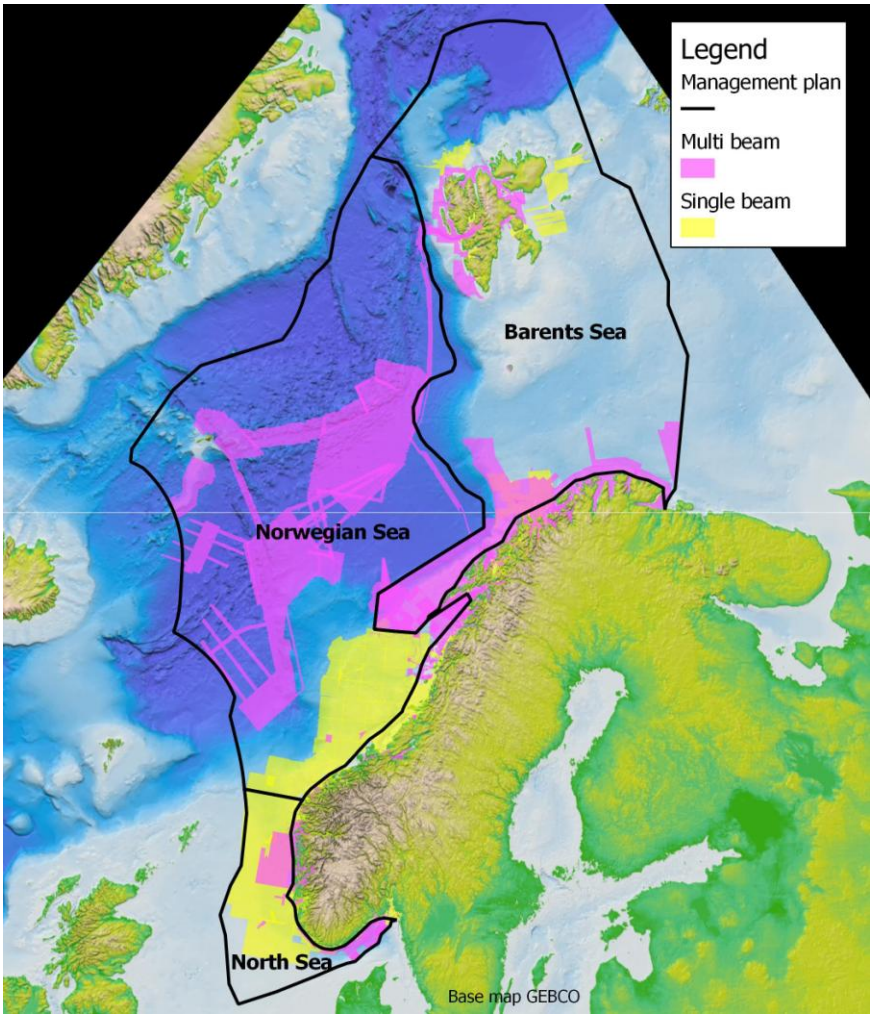

Figure 7. The Management plan areas and coverage of multi beam and single beam echo sounder data.

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

Results 2011: The MAREANO program received NOK 96.4 mill in total through earmarked funding. NHS received NOK 51.6 mill. 23 640 km^2 was surveyed in 2011 and 2 519 km^2 was received from University of Tromsø (measured in 2010). See overview of surveyed areas in figure 8 below.

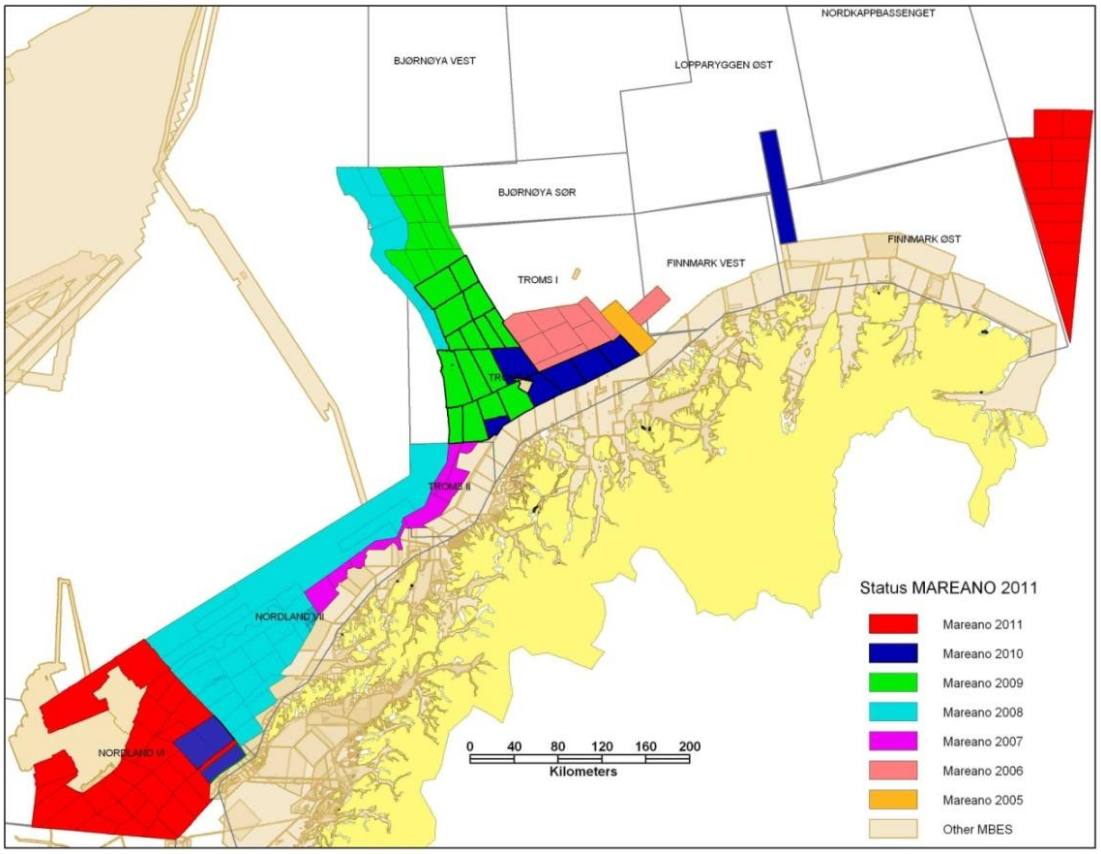

Figure 8. An overview of the surveyed area each year for the period 2005 - 2011

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 program 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.

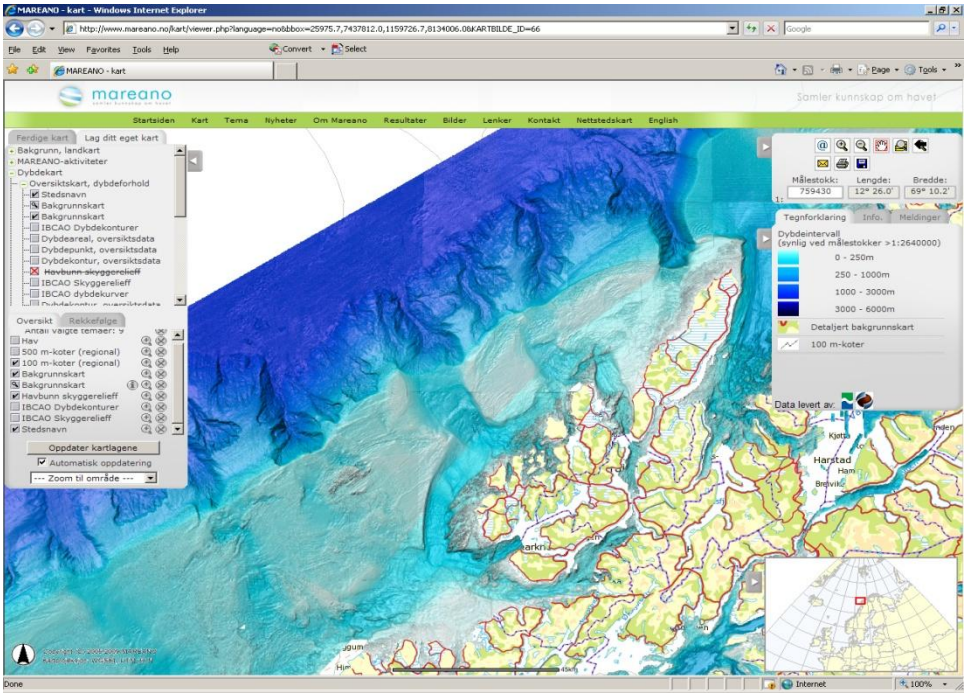

Figure 9. An example from the WMS shadow relief map service showing spectacular submarine canyons and slide scars on the edge of the most narrow part of the Norwegian shelf north of Lofoten and west of Andøya (screendump from map service on **www.mareano.no**)