

 <p>Kartverket</p>	<p><b>SAIHC 13<sup>th</sup> Meeting</b>  <b>Cape Town 30-31 August</b>  <b>2016</b></p>	<p><b>SAIHC</b>  <b>National Report</b>  <b>NORWAY</b></p>
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## ***NATIONAL REPORT*** ***NORWAY***

### **Executive Summary**

This report gives the summary of the activities and events that have taken place within the Norwegian Hydrographic Service (NHS) since the last report given at the SAIHC12. Some highlights:

- *New organization in place*
- *A socio-economic study initiated*
- *Stable production rate (surveying, data management and chart production)*
- *Continued high activity in the Mareano project*
- *Coastal Zone projects initiated*

### **1. Hydrographic Office**

The Norwegian Hydrographic Service (NHS) moved to new premises June 2015. The area is known as a “Knowledge hub” and we want to be part of this cluster. The relocation was a “strategic move” and we expect that synergies with relevant institutes take place over time.

Last year we informed that revised long terms goals and strategies for the Norwegian Mapping Authority (NMA) resulted in an Organizational Development (OD) activity, aiming at adjusting the organization to underpin the main strategic goals in addition to adjusting the organization to better serve the blue economy with bathymetric data. The outcome of the OD process was available as a report in autumn 2015. Internal discussion between the management and the unions resulted in some modifications of the proposed organizational changes. A new organization came into force from 1 January 2016.

NHS has entered into a contract for a socio-economical study with the purpose of investigating the benefits for society of having access to detailed bathymetric information. We would like to have an objective analysis of the need for bathymetric data and products. The study will also include an evaluation of the cost effectiveness of our data acquisition.

### **2. Hydrographic Surveys**

#### **Internal conducted surveying last 12 months**

Our survey vessel, R/V Hydrograf, and its two survey launches have been working in the coastal waters of Norway and Svalbard. In addition, R/V Hydrograf surveyed at open sea for

the MAREANO project (*see paragraph 9.2*). The two complete crew works 12 hours per day, 7 days per week for 4 weeks periods.

The implementation of the Caris post-processing tool for the survey team, included training, started early 2015. We used about 5 months to reach full production capacity with the new software.

The new survey launches (2014) have been well functioning during the whole year.

The total area surveyed along the Norwegian coast in 2015 was 820 km<sup>2</sup> and 600 km<sup>2</sup> at Svalbard (high north).

### 3. Nautical Charts

#### 3.1. 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 has been concentrating on replacing areas with old survey data (approx 11 000 km<sup>2</sup>) with new data. The NHS also had the objective to convert the remaining analogue paper charts (18 charts per Dec 31<sup>st</sup> 2014) to digital format. This task was completed in November 2015. The NHS has outsourced some of the production tasks.

#### 3.2. ENC production

Totally 94 ENCs in the user bands 2-6 have been upgraded with new multibeam survey data in limited areas and published as New Editions (NE) or new ENCs (EN). Figure 1 below illustrates the ENC coverage in coastal waters.

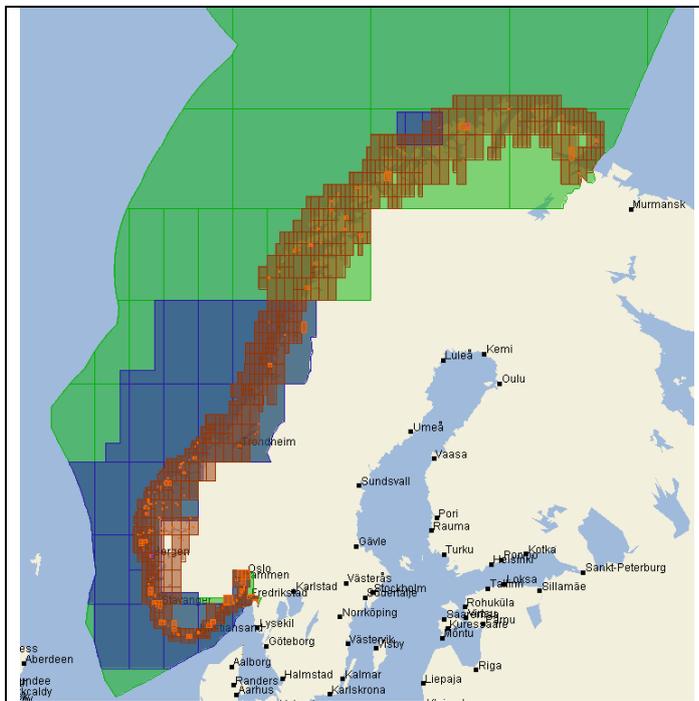
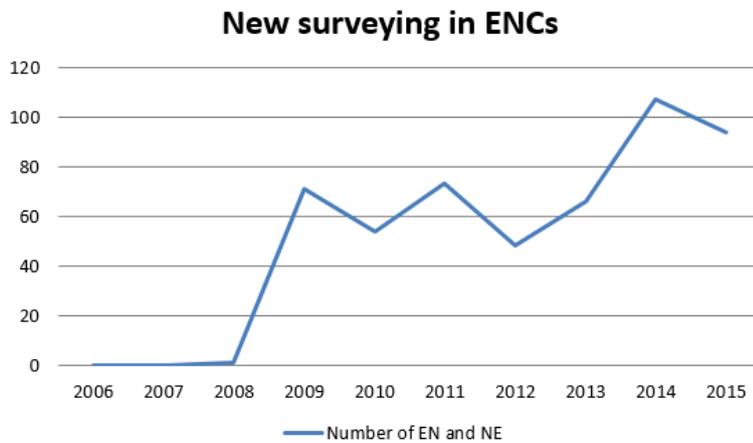


Fig. 1 ENC coverage for the Norwegian coastal waters (ENCs in User Bands 2-6).

The graph below shows the trend in upgrading the ENC with new survey information in recent years.

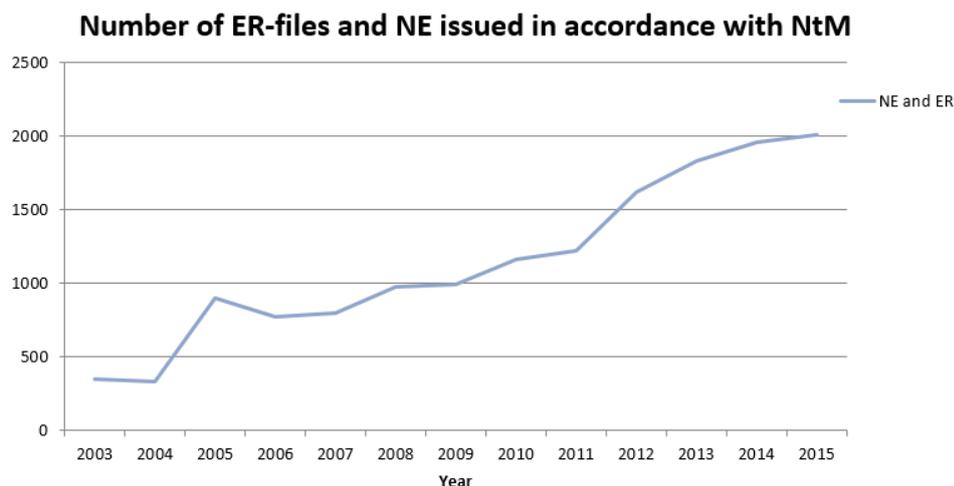


The total number of ENCs was 1130 at the end of 2015.

	<b>Usage Band</b>	<b>Compilation scale</b>	<b>No of ENCs</b>
<b>1</b>	<b>Overview</b>	<b>&lt; 1:1 499 999</b>	<b>3</b>
<b>2</b>	<b>General</b>	<b>1:350 000 – 1:1 499 999</b>	<b>69</b>
<b>3</b>	<b>Coastal</b>	<b>1:90 000 – 1:349 999</b>	<b>67</b>
<b>4</b>	<b>Approach</b>	<b>1:22 000 – 1:89 999</b>	<b>752</b>
<b>5</b>	<b>Harbour</b>	<b>1:4 000 – 1:21 999</b>	<b>200</b>
<b>6</b>	<b>Berthing</b>	<b>&gt; 1: 4 000</b>	<b>39</b>

Table above: Number of ENCs in each usage band per 31 Dec. 2015

The updates via ER profiles were issued in accordance with the Notices to Mariners (NtM) and distributed through Primar. A total of 2010 ER files and NE were issued as part of the continuous maintenance of the ENCs. Temporary (T) and Preliminary (P) notices were published as ER files. They are included in the numbers. The graph below shows the trend in recent years. NHS started to publish T/P notices in 2011.



### 3.3. Paper chart production

Totally 86 charts were published as new charts or new editions in 2015 for areas with updated survey data available: 15 harbour charts, 45 main charts, 12 coastal chart, 6 charts for Svalbard, 2 chart in the Antarctica and 6 general charts.

#### Print On Demand (POD)

The entire Norwegian chart portfolio was available as POD from late 2015.

No printing of charts have taken place after March 2015. New editions are available only as POD-charts.

## 4. Nautical Publications

The Norwegian Pilots Guide «Den norske los» is to be revised and more customized for the professional users. A pilot project with the purpose of developing a test version of a Digital Pilot was initiated in the first half of 2016. The new solution will be available for browsers and tablets as an app. The information content will be based partly on our charts and partly on georeferenced information from external partners (like refueling locations, mooring positions, electricity supply etc.). The test version of the new product will cover a small part of the coastal area.

Until the revised editions are available, the current updated pdf versions of the Pilots can be downloaded from The Norwegian Hydrographic Service's homepage: [www.kartverket.no](http://www.kartverket.no). The Pilots are updated twice per year (May and November). Important changes are reported in the Notice to Mariners.

#### Notices to Mariners (Etterretninger for sjøfarende (Efs))

24 editions were published in 2015. The publication is only available on the Internet, free of charge for downloading, at the Efs service [www.kartverket.no/efs](http://www.kartverket.no/efs). The Internet solution also allows searches for messages sorted for each chart index. The Efs service provide tracings as a supplement to the notices.

## 5. MSI

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

## 6. C-55

The last update of C-55 was done in December 2015.

## 7. Capacity building

Norway participated in the annual meeting of the IHO Capacity Building Sub-Committee in May 2016. The IRCC and the CBSC encourage Member States from the most developed regions to be involved in capacity building by assisting CBSC activities or by other means.

NHS entered into a cooperation with Albania in September 2014. The project will last until the end of 2017. The main goals are related to building competence and capacity within surveying and ENC/paper chart production. Two students have finalized Cat B courses in hydrography. A Data management and Chart Production system has been acquired and training delivered. The very first ENC was produced in March 2016 and is subjected to quality control at Primar. A survey launch, fully equipped with multibeam echo sounder system, attitude sensors and positioning solution, will be ready at the end of 2016.

## 8. Oceanographic activities

NHS has a network of 24 permanent tide gauges and operates several temporary gauges.

The Norwegian Mapping Authority is involved in long-term monitoring sea level change, and NHS has done statistical analyses on water level series from our tide gauge network. Water levels with different return periods are found and published on our web-pages:

<http://kartverket.no/sehavniva/>. The report "Sea Level Change for Norway" (in English) can be downloaded from: <http://kartverket.no/en/sehavniva/new-report-on-future-sea-level-changes/>

A significant activity is related to establishing the CD at places where the Norwegian Coastal Administration is doing dredging work or building breakwaters. The additional water level measurements will increase our knowledge of the tide in Norwegian waters.

## 9. Other activities

### 9.1 Southern Sunnmøre projects.

#### Background

Within the Norwegian Mapping Authority three projects have been initiated that implies cooperation between the *Hydrographic Service*, the *Mapping and Cadastre* and the *Geodetic Institute*. All the projects are in an initial phase and are related to the same geographical region.

A former project in the actual region has provided basic marine maps of the surface geology with rather detailed bathymetric information. In general, the military classification scheme impede us from publishing bathymetric information with higher resolution than 50x50 meter. This restriction has been lifted for an area of 825km<sup>2</sup> and the bathymetric data may be presented at any resolution. This creates

new possibilities for the Hydrographic Service to demonstrate products based on MBES surveying and any other technique.

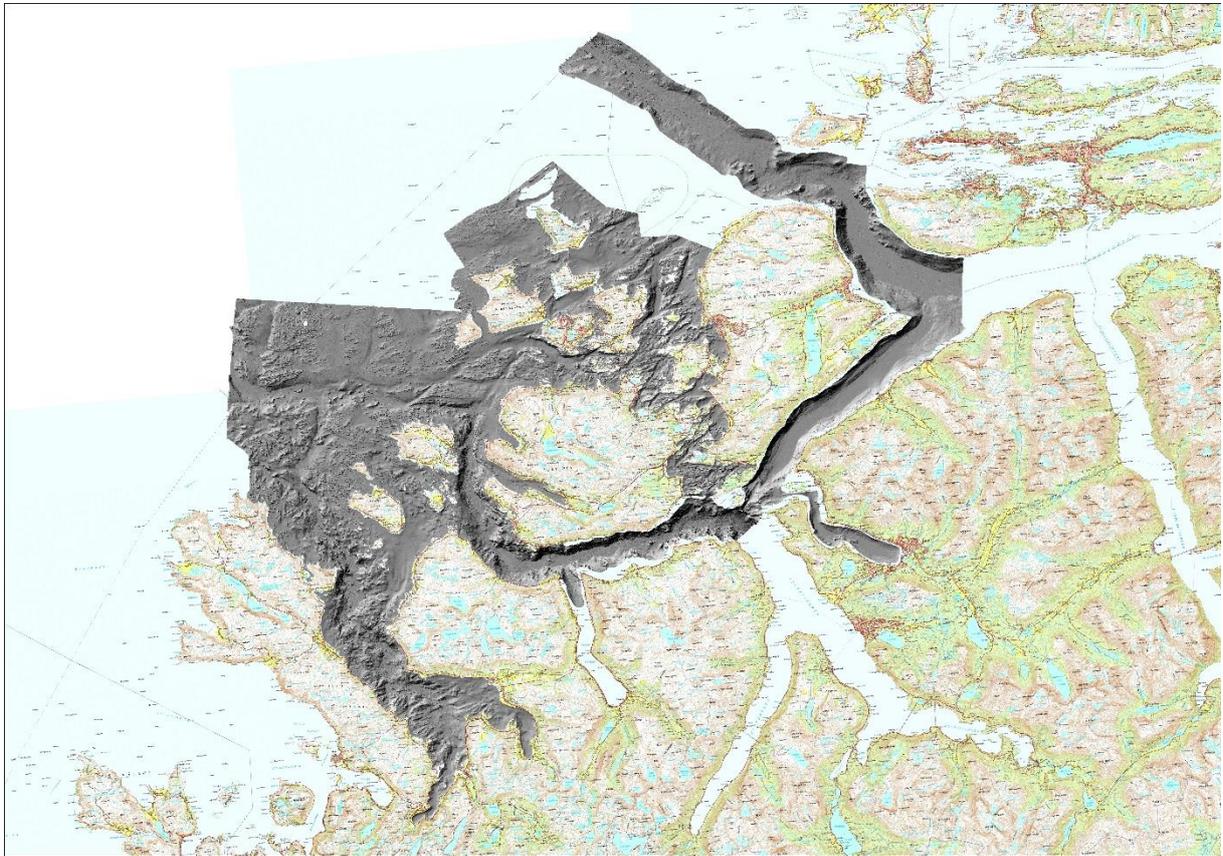


Fig. 2. The grey area constitute the sea area of the projects

### **Description of the projects and expected outcome**

The projects aim at

- Establishing a common reference frame for elevation data (depths at sea and heights at land)
- Close the gap between the existing data in the maps and the navigational charts
- Demonstrating how an integrated sea and land model can be utilized to visualize for example sea level changes

The “Common reference frame for sea and land” will establish a Mean Sea Surface related to the ellipsoid and improve the existing model of the quasi geoid by collecting high quality data for water level, levelling, gravity and GNSS. The new information will be used to connect the Chart Datum for bathymetry to the reference for topographic data (NN2000). The project has started and will last until the end of 2017.

The project “Green Laser Southern Sunnmøre” (GLaSS) will collect data from the coastal zone, down to appr. 5 meters depth, by utilizing airborne green laser. Together with existing bathymetric data and topographic data, a seamless high-resolution terrain model will be created. The surveying was planned for 2016, but the offers were outside the limits of a budget. Some adjustment to the plans have been done and a new tender process is ongoing. The surveying will be split into two periods, autumn 2016 and spring 2017. The final report is expected before the end of 2017.

In the project “Vizualization of the sea level” we will combine the detailed elevation model with information of historic storm surges, prediction of future sea levels etc. This will be a tool for planning functions, decision makers etc. The project will include analysis of GNSS and InSAR observations, to improve estimates of local sea level change. Others location data information might also be combined with the elevation model. The project will start up in 2016.

## **9.2. 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 and the management plan for the Norwegian Sea (see figure 3 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)

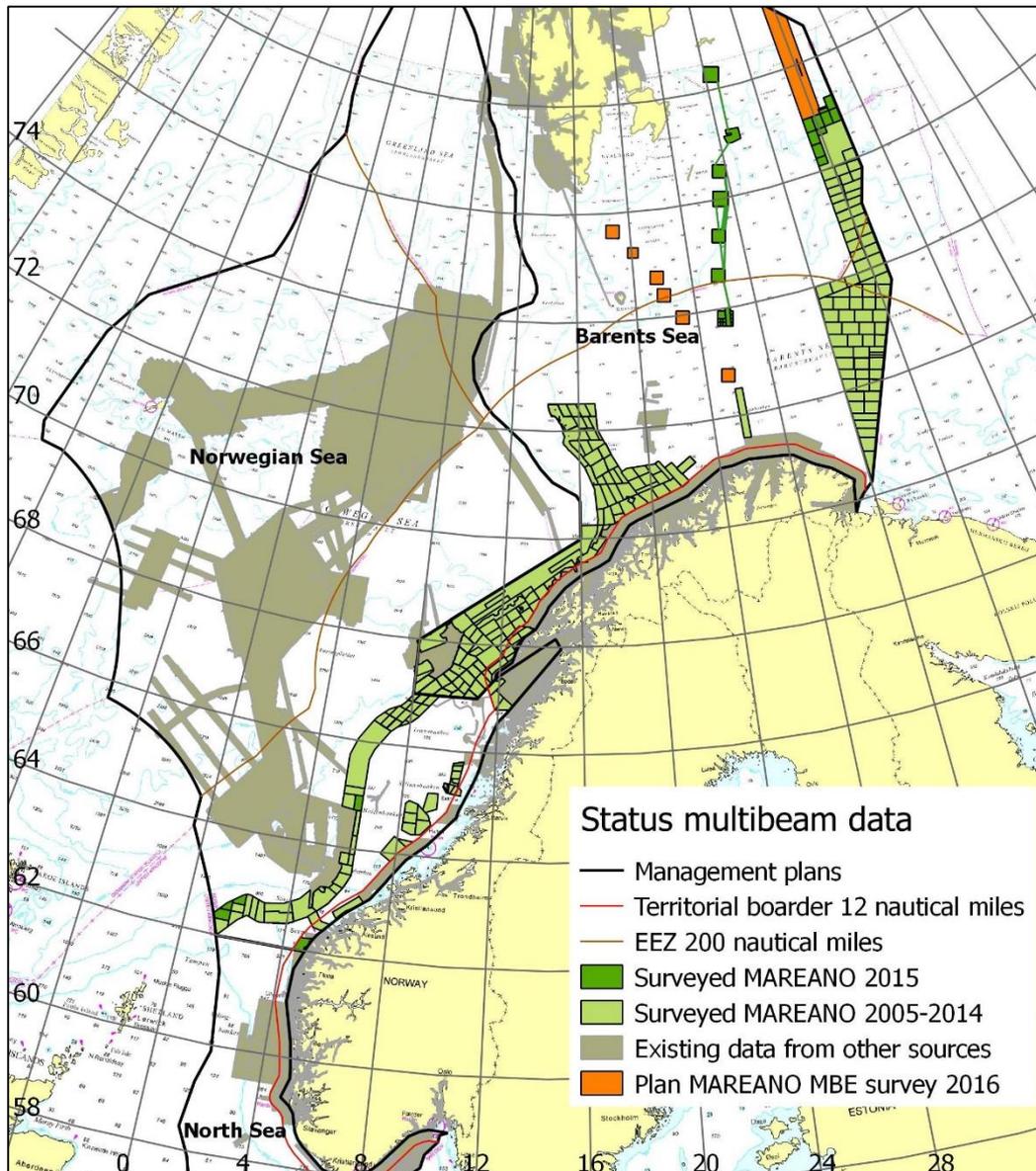


Figure 3. The Management plan areas and coverage of multi beam echo sounder data.

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

**Results 2015:** The MAREANO program received NOK 93.1 mill in total through earmarked funding. NHS received NOK 43.8 mill. 13 000 km<sup>2</sup> was surveyed in 2015.

**Data distribution:** The multibeam data 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 [www.mareno.no](http://www.mareno.no).

**NSDI:** According to the MAREANO data policy all geodata from the MAREANO programme will be published in the Norwegian spatial data infrastructure; *Norge Digitalt* [www.geonorge.no](http://www.geonorge.no).

MAREANO will be a major undertaking for the NHS in the years to come, and is mainly aimed at non-navigational purposes.

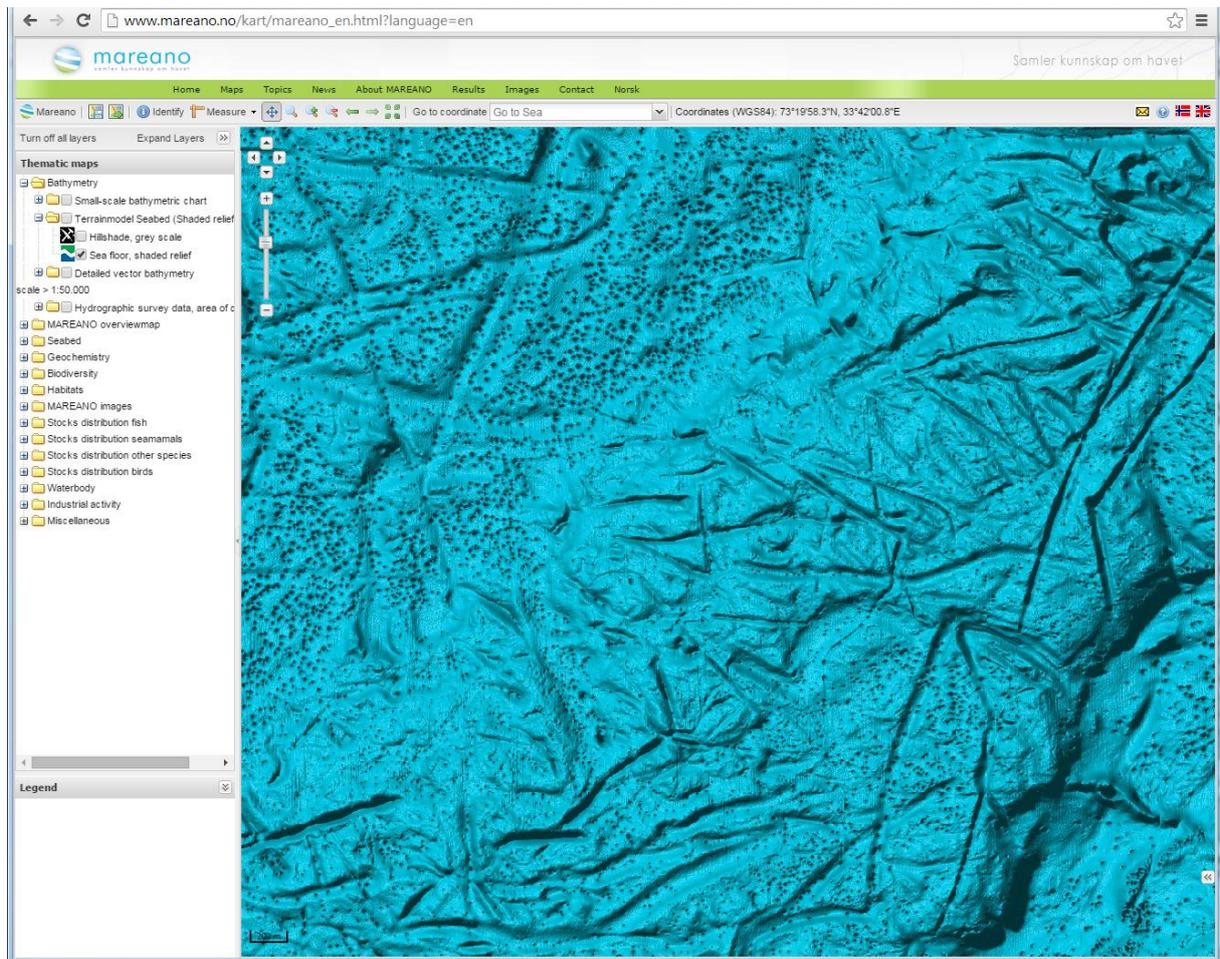


Figure 4. An example from the WMS shadow relief map service showing seabed with pockmarks and iceberg plough marks in the Barents Sea (screenshot from map service on [www.mareano.no](http://www.mareano.no) )

### 9.3 BarentsWatch

The Norwegian Mapping Authority are participating in an intergovernmental cooperation on developing and establishing a general Information and surveillance system, covering the High North and the Norwegian coastal and sea areas. BarentsWatch aims to offer integrated knowledge and information services to the public, and will also support efficient coordination between governmental services through a common information picture. A core part of the system consists of map services, based on geographic information services from official sources. Marine Spatial Planning became a separate activity in 2014. NHS is a major contributor to Barentswatch. So far, the cooperation counts 30 national partners. Ref.: <https://www.barentswatch.no/en/>

#### **9.4 International activities**

The NHS is involved in several Working Groups, Committees and Commissions related to IHO. Norway has representatives in the following Working Groups: S-100, DQ, ENC, NC, NIP, TWC, IEN, MSDI, CBSC and WEND. We recently also joined the CSBWG. We have participated in the latest HSSC and the IRCC meetings. Norway is participating in 5 Hydrographic Commissions: ARHC, HCA, NHC, NSHC and SAIHC.

As operator of Primar we participate in all related meetings.

During the last few years we have contributed with a substantial part of high resolution bathymetric data, obtained through the Mareano project, to the GEBCO (and IBCAO) database.

A model with grid size of 50x50 meter, based on all available survey data from Norwegian coastal waters, has been developed. The information is made available to EMODnet.

NHS is an active partner in the EU project Coastal Mapping. We are involved in all Work Packages and chair a sub work package on “Sharing platforms”.