Agenda item 6B

6th Meeting of the Arctic Regional Hydrographic Commission
3 and 6 October 2016
Iqualuit, Nunavut, Canada,

Hydrographic National Report of Denmark

September 2016

Executive summary
This report gives a summary of the main activities within the Danish Hydrographic Office since the last report given at the ARHC5 meeting in Saint Petersburg October 2015.

1. Hydrographic Office

The present report outlines and sums up the activities carried out by the Danish Geodata Agency, with special focus on its hydrographic activities since last NHC meeting.
The Danish Geodata Agency is part of the Danish Ministry of Energy, Utilities and Climate. The Ministry consists of the Department, the Geological Survey of Denmark and Greenland, the Danish Meteorological Institute, the Danish Energy Agency, the Danish Geodata Agency, the Danish Energy Regulatory Authority and Energinet.dk and the Agency for Data Supply and Efficiency.

New organisation from January 2016
Due to the plan "Better balance - Government institutions closer to citizens and businesses", the Danish Government moves more than 3,900 governmental jobs outside the Copenhagen area. The main purpose is to create activity and stimulate regional development.
As a consequence, January 1, 2016 the Danish Geodata Agency was divided into two new separate governmental agencies the Danish Geodata Agency (DGA) with a new location in Aalborg in the northern part of Jutland and the Agency for Data Supply and Efficiency with a location in Copenhagen.
DGA will be situated in Aalborg from November 2016 and it will have approximately 120 employees; the agency is responsible for cadastre and hydrography including the role as the Danish Hydrographic Offices. DGA is also responsibility for the implementation of the Danish MSDI. The remaining tasks have been transferred to the Agency for Data Supply and Efficiency.
The relocation of GST to Aalborg in late 2016 will however affect the work of the organisation and as a consequent DGA will have to prioritise the production.

Within both the property sector and the maritime area, DGA is focused on inter-governmental co-operation in order to ensure the best possible service to citizens and businesses, as well as to ensure effective solutions across the public sector and safety at sea.

New internal structure in the Danish Geodata Agency January 2016

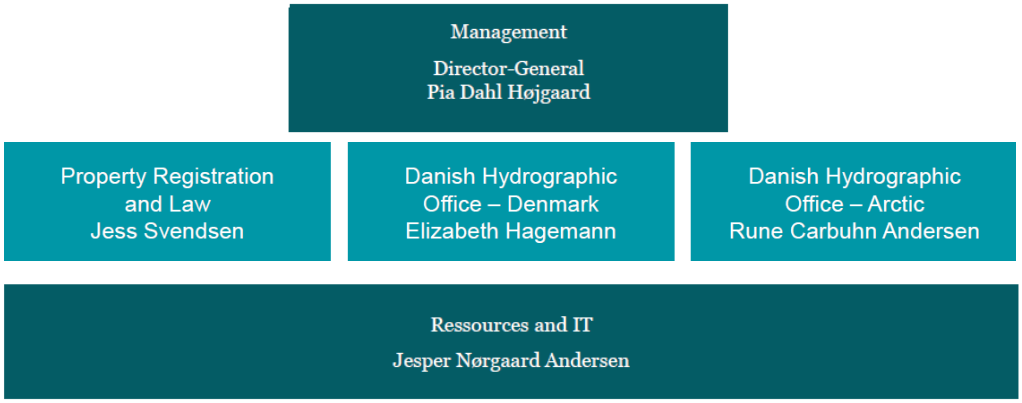

Figure 1. The new internal structure of the Danish Geodata Agency

The Danish Geodata Agency in its role as Hydrographic Office has responsibility for hydrographic surveys and charting in Denmark. It is responsible for the production of nautical charts of the waters surrounding Denmark, the Faroe Islands and Greenland, just as the Danish Geodata Agency also represents Denmark internationally within the marine geodata field (MSDI). The Danish Geodata Agency is responsible for technical support to delimitation of the Danish maritime boundaries, charting, and issuing Chart Corrections and related nautical publications such as INT 1 and pilots (sailing directions).

The practical work of hydrographic surveys is still done with personnel and ships from the Royal Danish Navy. Survey personnel from the Navy are stationed in the Danish Geodata Agency.

The Danish Geodata Agency works closely together with the Danish Maritime Authority, which is responsible for issuing of Notices to Mariners, List of Lights. Tide tables and operational tide gauges are the responsibility of Danish Meteorological Institute.

2. Surveys

Coverage of new surveys

The Danish hydrographic survey operations have been carried out in the following areas in 2015:

1. Danish waters inside the Skaw according to the HELCOM RE-SURVEY plan of the Baltic routes and areas.
2. The west coast of Greenland.

Danish waters:

The hydrographic surveys inside the Skaw are carried out in accordance with the HELCOM Copenhagen Declaration, adopted on 10 September 2001 by the HELCOM Ministerial Meeting. In addition, survey of areas with intense traffic in the North Sea has been initiated.

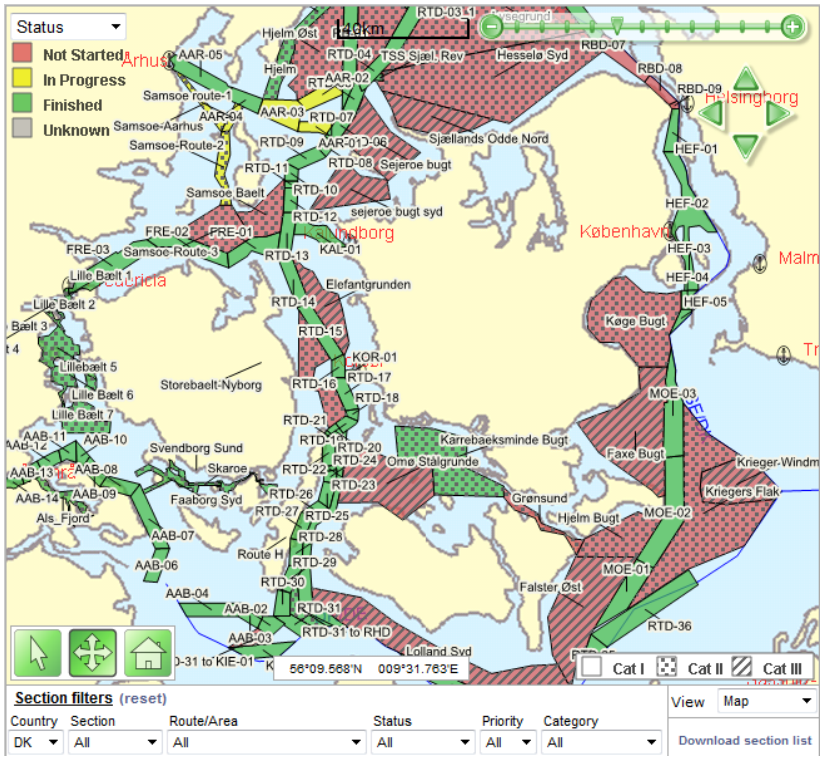

Figure 2. Part of the HELCOM re-survey plan

In accordance with the Declaration a coordinated survey plan has been made for re surveying the Baltic Sea area. Therefore, the main survey effort has been placed on the primary shipping routes through the Danish waters and other areas of interest for navigation. The routes and areas will be re-surveyed to meet the standards of "Special Order" or "Order 1" as set in the International Hydrographic Organisation "Special Publication No 44".

The Surveys in 2016 will be a continuation of the revised coordinated re-survey plan for the Baltic area. See the HELCOM web site for details:
https://helcomresurvey.sjofartsverket.se/helcomresurveysite

Greenland waters:
The surveys on the West Coast of Greenland were carried out in the archipelago and near coastal zone, in order to allow safe access to major ports and to locate sheltered coastal fairways. A prioritized program for the resurvey of Greenland waters is in force. The main emphasis is placed on the most populated areas on the West Coast.

All surveys were carried out with multibeam echo sounder systems.

The surveys in the Greenland waters in 2016 will be a continuation of the re-surveying program of the inshore routes between ports in Greenland. Some near shore areas and fiords are being surveyed for the safety of cruise ships operating on the west coast.

New ships
As a replacement for the two small survey ships, SKA 12 and BIRKHOLM,a new survey concept for Greenland is under development. The concept aims at a more geographically flexible capacity with one large ship and two in situ launches. This concept is planned to be fully implemented in 2016. As part of implementation of a new concept, the Danish navy arctic patrol vessel "Ejnar Mikkelsen" has been equipped with a RESON 7111 100 KHz multi beam echo sounder. The in situ motor boat SAR-1 has been equipped with a portable high frequency system from R-2 Sonic for surveys in the narrow in shore routes. Survey trials were carried out on both sides of Greenland. The concept has proven to be

very flexible and makes it possible to conduct surveys in a wider range of environments. The strength of the concept is the cost effectiveness, since the navy ship is already in place and is capable of performing other prioritised tasks on short notice. The survey ship SKA 12 is decommissioned in March 2016, after 28 years of service in Greenland.

Figure 3. SKA 12 is taken out of service after 28 years in Greenland

Figure 4. Danish Navy Arctic patrol vessel with 12 meter boat SAR-1.

Problems encountered:
No new problems where encountered in 2015.

3. New charts & updates
Charts (paper as well as electronic navigational charts (ENC)) covering the Danish, Faroese and Greenlandic waters are produced and updated by the Danish Geodata Agency.

ENC
The Danish waters have been covered by ENCs in various navigational bands since June 2000.
All the agency's ENCs are updated on a weekly basis.

ENC distribution method
In 2015, all the Danish-produced ENCs and updates (ERs) were distributed through a network of IC-ENC authorized distributors.

Charts
25 new Danish editions were published in 2015.

National paper charts
The chart portfolio of the Danish waters comprises 63 charts, all produced according to international standards.

The chart index showing the Danish waters is available at:
http://www.danskehavnelods.dk/indexkort/danskesoekort.html

The chart index showing the Greenlandic waters is available at:
http://www.danskehavnelods.dk/indexkort_gronland/gronlandskesoekort.html

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Geometric rectification of the Greenlandic charts
The geometric rectification of the Greenlandic charts has reached 32 charts. Since the start of the project. The line of production is now based on the principle "data and ENC first" which means that data are being enriched to ENC standard before paper chart are being produced. This result in the final ENC distribution is only slightly behind the paper chart distribution

Faroese waters
All the Faroese paper charts were converted to ENCs and released in 2012.

4. New publications & updates

New publications
- The Mariner´s Handbook – East Greenlandic Waters (in Danish/in English)

Updated publications
The Danish Maritime Safety Authority updates the following publications and reports online:
- Navigation through Danish Waters
- Tide tables for Danish, Faroese and Greenland waters

The Danish Geodata Agency's online publications:
- Charts and publications catalogue (in Danish)
- Kort 1/INT 1 (bilingual)
- Søkortrettelser/Chart Corrections (bilingual)
- Bag om søkortet/Behind the Nautical Chart (in Danish/in English)
- The Mariner´s Handbook – Danish Waters (in Danish)
- The Danish Harbour Pilot (in Danish)
- The Greenlandic Pilot - East Greenlandic Waters (in Danish/in English)
- The Greenlandic Harbour Pilot (in Danish)

The Danish Geodata Agency's printed publications:

- Charts and publications catalogue (in Danish)
- Kort 1/INT 1 (bilingual)
- The Danish Pilot (in Danish)
- The Danish Harbour Pilot – Commercial Ports (in Danish)
- The Greenlandic Pilot - West Greenlandic Waters (in Danish)
- The Faroese Pilot (in Danish)
- The Faroese Harbour Pilot (in Danish)

5. MSI

NAV Warnings, Information to mariners and oceanographic forecasts are available in English on the following web pages:

Navigational warnings Denmark:
http://www.dma.dk/Ships/Sider/MaritimeSafetyInformation.aspx

Meteorological warnings and forecasts Denmark:
http://www.dmi.dk/en/vejr/
http://ocean.dmi.dk/anim/index.uk.php
http://ifm.fcoo.dk

Meteorological warnings and forecasts Faroe Islands:
http://www.dmi.dk/en/faeroeerne/
http://ocean.dmi.dk/anim/index.uk.php
http://ifm.fcoo.dk

Meteorological warnings and forecasts Greenland:
http://www.dmi.dk/en/groenland/
http://ocean.dmi.dk/anim/index.uk.php
http://ifm.fcoo.dk

6.

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State of surveys updated March 2016

Area	A1	A2	B1	B2	C1	C2	Comment
Denmark south	95	100	5	0	0	0	Contributes to the HELCOM harmonised re-survey programme.
Denmark Faeroes	100	100	0	0	0	0	Revision of ports and resurveys ongoing
Denmark Greenland	25	20	25	10	50	70	The coastline of Greenland is very com-plex and the total sea area of the EEZ is ca. 2.000.000 square kilometres. Due to perma-nent ice cover, the limit for navigable waters has been set to 75 degrees northern latitude. Thus the percentages are rough approxima-tions. The East coast is sparsely populated and only surveyed near populated areas. A prioritised programme is in force to resurvey navi-gable routes to and between populated areas on the West Coast of Greenland, to modern standards.

7. Capacity Building

FAMOS

DGA is participating in the EU-project FAMOS together with most of Hydrographic Offices in the Baltic Sea countries. The purpose of the project is to increase both the survey capacity for the national waters and the capacity for the following data processing. The FAMOS project is for GST a possibility to increase the data processing capacity though slightly increased number of staff and developing new and more efficient data processes for production of ENC and chart.
So far FAMOS has resulted in a new conceptual design of the IT-infrastructure for the bathymetric databases, analyses of dataflow for "ping to DB" and a new tool for generating depth contours and selecting soundings.

EfficienSea 2

DGA participate in the European project Efficient, Safe and Sustainable Traffic at Sea - EfficienSea 2.0. The aim of EfficienSea 2 project is to improve navigational safety and efficiency as well as emergency response, to decrease administrative burdens and improve environmental monitoring and enforcement. The development of a Maritime Cloud – a communication framework for both e-Navigation and e-maritime – is central, as is the maturing of emerging communication technologies improving ships connectivity. The project will showcase e-navigation services in the Baltic and in the Arctic while contributing to upgrade of international maritime safety regimes. The project has 32 partners from twelve countries including eight Baltic Sea region countries.

The focus is to co-create and deploy innovative solutions for safer and more efficient waterborne operations encompassing excellent technical and human factor competences, equipment, system- and service providers as well as authorities, with expert domain and regulatory knowledge and influence. With a total of seven specific objectives all interacting within one framework, the project targets the following:

1. Create and implement a ground-breaking communication framework – the 'Maritime Cloud' that will enhance information sharing in and around the maritime sector for smarter traffic management, facilitating a comprehensive e-maritime and e-navigation environment, enabling the maritime internet of things.
2. Identify, develop, test and, where possible, standardise and implement e-navigation solutions that will reduce the risk of accidents, especially in dense waterways, as well as increase the efficiency of the transport chain.
3. Develop, test and, where possible, implement e-maritime solutions for automated reporting and efficient port information and, thus, minimise delays and turnaround times as well as administrative burdens.
4. Create and implement navigational support services and a new self-organizing emergency response solution in remote and difficult environments such as the Arctic in order to reduce the risk of loss of life.
5. Develop solutions to monitor emissions with a focus on SOx and conduct validation trials in the Baltic Sea Region.
6. Create innovative and cost-effective solutions with novel communication technology to deal with ships' challenge of getting access to information services at a reasonable price, especially in remote places such as the Arctic.
7. Set the technical and governance standard for the above areas, particularly in regards to e-navigation solutions.

New technologies and/or equipment

All ships in the Danish survey fleet are equipped with Reson 7125 200/400 KHz SW2 multibeam systems. Test trials have been conducted in 2015 with the aim to survey directly on a LAT-model of the waters around Greenland. This method will, in time, make tide gauges redundant for surveys in the south of Greenland.

8. Oceanographic activities

Tide gauge network

The Danish Meteorological Institute and other governmental bodies, maintain a network of water level stations spread across Denmark. The data is used in several ways, primarily for safety of navigation, but are also an integral part of the national storm surge monitoring and prediction system. Data updated are transferred from each station to the oceanographic database every ten minutes.

Online observations and fore-casts are available in Danish and English on several web sites such as: http://fcoo.dk/

Tidal prediction

Tides are predicted and presented for a range of Greenland cities.
Tidal predictions are available on line at the Danish Meteorological office as tables www.dmi.dk and as a graphic interface at http://fcoo.dk/

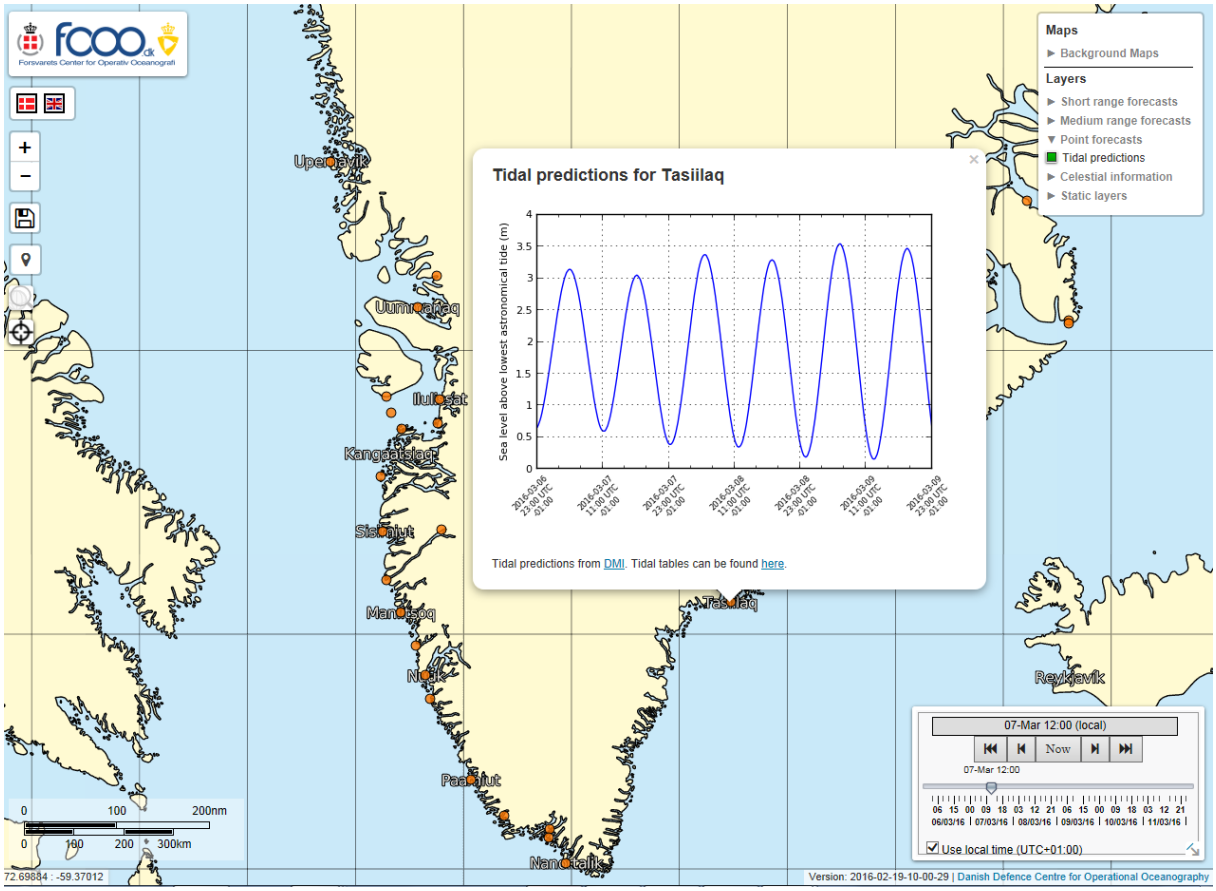

Figure 5. Tidal prediction in Greenland

Greenland LAT-oide project

During the 2015 survey season, the Danish Geodata Agency continues a pilot project, with the aim of testing the feasibility of surveying directly on the spheroid in Greenland. The project involves, setting up numerous tidegauges ashore with the purpose of tying the local LAT levels to a general LAT model developed by the Danish space agency. The general LAT model is claimed to be valid from open sea and until 5 miles from the shore. The project which aims at trying the of shore model to the more shallow coastal areas is not yet finalised. Preliminary reports are promising. The project is expected to continue in the 2016 survey season.

UNCLOS
The Danish Geodata Agency is actively involved in the work of The United Nations Convention on the Law of the Sea (UNCLOS) in the waters around Greenland and the Faroe Islands.

The Danish Geodata Agency is responsible for the data quality assessment on existing bathymetric data and planning and technical specifications for new surveys. There have been no new UNCLOS surveys in 2014 in the Danish area of interest.

9. Other activities

Participation in IHO Working Groups
The Danish Geodata Agency has the chairmanship for the IHO MSDI Working Group and the Baltic Sea and North Sea MSDI Working Group (BS-NSMSDIWG).

The Danish Geodata Agency has been involved in the work done by CSPCWG, SNPWG, DQWG, EUWG and HSSC.

National
Denmark
Within the framework of the Danish "Basic Data Programme", which was launched on January 1, 2013, a large proportion of the geodata held by GST are now available for commercial and non-commercial purposes - free of charge. This includes topographic data (maps), the cadastral map and the Danish Elevation Model. It does not include nautical charts and underlying data from hydrographic surveys.

The Basic Data Programme is part of the national eGovernment Strategy for 2011-2015. The programme contains a number of specific improvements and initiatives in public sector basic data that underpin greater efficiency and economic growth. Basic data are widely used throughout the public sector and are an important basis for public authorities to perform their tasks properly and efficiently. Basic data are also a potential driver for innovation, growth and job creation in the private sector.

In 2014 it was decided to establish a Danish Marine Spatial Data Infrastructure. 11 Danish agencies participate on a voluntary basis.

Greenland
As a result of the Executive Order on the free use of data on Greenland a large number of geodata from Greenland was made freely available to the public from 1 January 2016.
Free geographical data can help to facilitate administrative procedures and create the basis for growth in Greenland. The data made available are e.g. topography-made maps and aerial photographs.

International
The Danish Geodata Agency is also active in the HELCOM Monitoring Working Group.

Websites
The Danish Geodata Agency:
http://www.gst.dk/English/
navigation-gl.gst.dk/English/

The Danish Maritime Authority:
http://www.dma.dk/

Danish Meteorological Institute:
http://www.dmi.dk