



**9th ARHC Conference**  
**Murmansk, Russian Federation**  
**17-19 September 2019**

**National Report of Denmark**  
 September 2019

**Executive summary**

This report gives a summary of the main activities within the Danish Hydrographic Office since the last report given at the ARHC 8 meeting in Svalbard, Norway September 2018.

**1. Hydrographic Office**

The Danish Geodata Agency is part of the Danish Ministry of Climate, Energy and Utilities. The Danish Geodata Agency in its role as a hydrographic office has responsibility for hydrographic surveys and charting of the waters surrounding Denmark, the Faroe Islands and Greenland. The Danish Geodata Agency is responsible for the Danish MSDI and represents Denmark internationally within the marine geodata field (MSDI). The Danish Geodata Agency is responsible for charting, and issuing Chart Corrections and related nautical publications such as INT 1 and pilots (sailing directions) and for technical support to delimitation of the Danish maritime boundaries.

The practical work of hydrographic surveys is done with personnel and ships from the Royal Danish Navy. Survey personnel from the Navy are part of the organization of 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 and List of Lights. Tide tables and operational tide gauges are the responsibility of Danish Meteorological Institute.

**2. Surveys.**

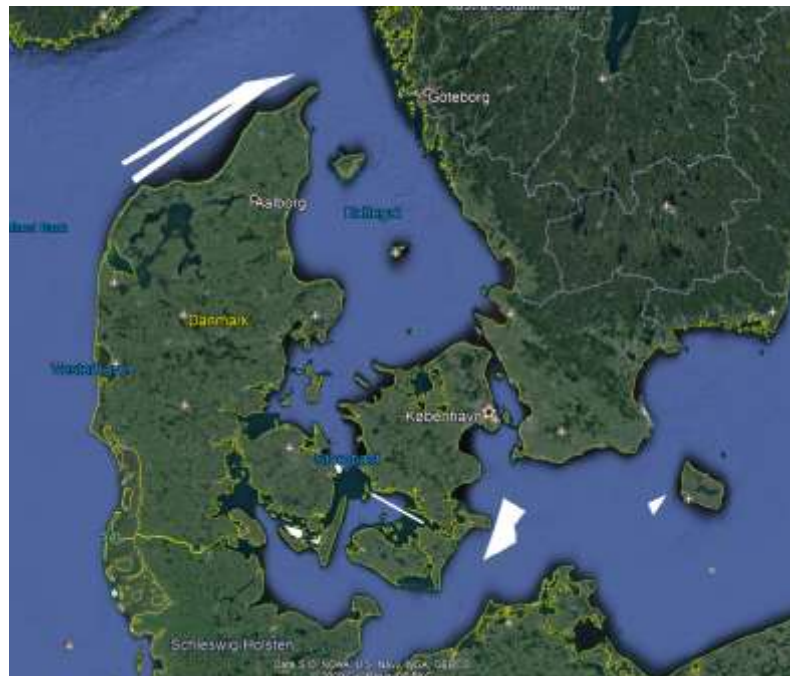
**2.1. Coverage of new surveys**

The Danish hydrographic survey operations were carried out in the following areas in 2018:

1. Danish waters inside the Skaw according to the HELCOM RE-SURVEY plan of the Baltic routes and areas. New IMO recommended routes in the North Sea were partly surveyed in 2018.
2. The west coast of Greenland.

**2.2. Danish waters:**

The hydrographic surveys inside the Skaw were 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 1. 2018 survey areas in Denmark.*

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 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 2019 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>.



*Figure 2. Planned surveys for 2019.*

In addition to the original HELCOM resurvey plan, Denmark and Sweden is preparing a revision of the routes from Skagen through the Kattegat. Some of the proposed changes will be re-surveyed in 2018-2019.

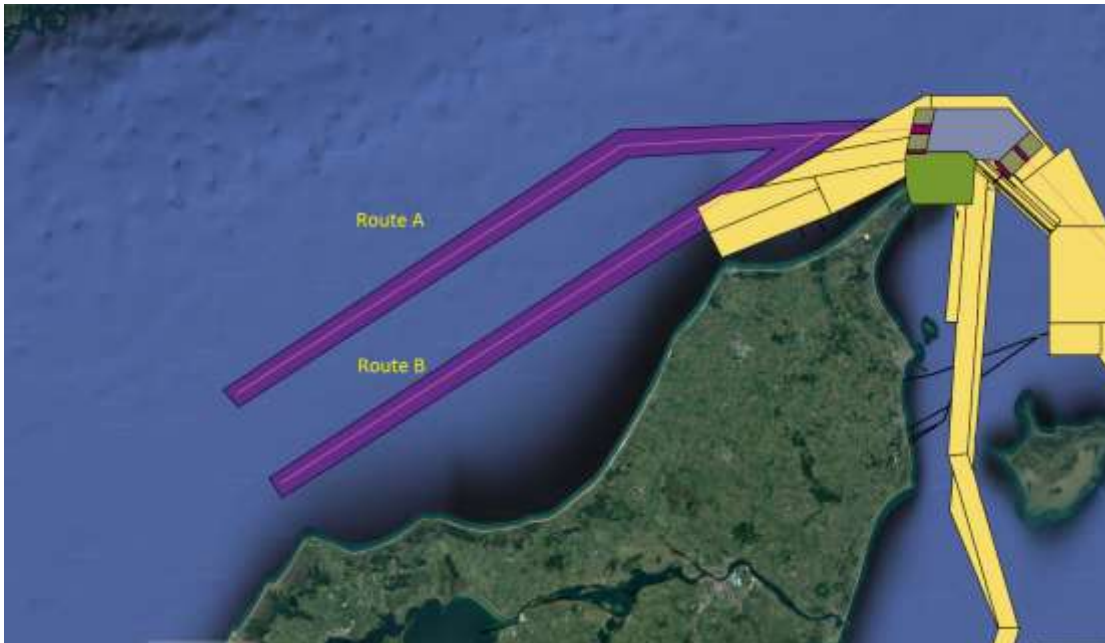


Figure 3. Surveys for 2019.

### 2.3. 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 2019 will be a continuation of the re-surveying program of the inshore routes between ports in Greenland. Some near shore areas and fjords are being surveyed for the safety of cruise ships operating on the west coast.



Figure 4. Survey areas in Greenland 2019

### 2.4. New ships

Denmark has commissioned two new survey platforms in 2018.

Name:	SOM-1 and SOM-2
Displacement:	13 ts.
Year of Commission:	2018
Number of crew:	3
Speed:	30 knots



Figure 5. One of two new shallow water survey boats SOM-Class

### **3. New charts & updates.**

#### **3.1. General**

##### **ENC distribution method**

All the produced ENC's and updates (ERs) are distributed through a network of IC-ENC authorized distributors. All 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.

#### **3.2. Denmark and Faroe Islands**

##### **New Charts**

16 new Danish editions were published in 2018

##### **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>

New ship route system in the Skagerrak and Kattegat.

DGA is in the process of producing and publishing a number of new paper and electronic charts covering the relevant areas. The work includes processing of new depth data as well as renewed and closer selection of depths from existing depth data. In addition, harmonization of depth data across the border to Sweden is included. An updated coastline is added to the new charts.

The chart portfolio of the Faeroe waters comprises 8 charts including charts with harbour plans all in varying quality. All new charts are produced according to international standards. The chart index showing the Faeroe waters is available at:

[http://www.danskehavnelods.dk/indexkort\\_faeroerne/faeroskesoekort.html](http://www.danskehavnelods.dk/indexkort_faeroerne/faeroskesoekort.html)

#### **3.3. Greenland.**

The chart portfolio of the Greenlandic waters comprises 80 charts and several charts with harbour plans all in varying quality. All new charts are produced according to international standards.

The chart index showing the Greenlandic waters is available at:

[http://www.danskehavnelods.dk/indexkort\\_gronland/gronlandskesoekort.html](http://www.danskehavnelods.dk/indexkort_gronland/gronlandskesoekort.html)

Geometric rectification of the Greenlandic charts

The geometric rectification of the Greenlandic charts has reached 34 charts. 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 charts are being produced.

By August 2019 all 34 charts are published as both ENC and paper charts.

### 3.4. Challenges

2016-2018 has been a transition period for the Danish Hydrographic Office. Due to a relocation from Copenhagen to Aalborg in 2016 many experienced employees left the office for other jobs. We have now established a new organisation with new employees of which most have less experience. The number of new editions of paper charts in Denmark in 2017 and 2018 has been lower than previous. The production unit for Greenlandic charts has been completely restaffed and has managed to finalize and distribute 2 new products over Greenlandic waters in 2018. The Greenlandic chart production team will continue to re-establish the needed knowledge base for chart production and will focus on selected data processes and the capability to produce ENC and paper charts and updates to ENC and paper charts in 2019.

## 4. New publications & updates.

### 4.1. New publications

The publication Greenland Pilot - Sailing Directions for West Greenland was published in Danish and in English versions in April 2019. The publication describes the west coast of Greenland from Nunap Isua (Kap Farvel) to Kap Morris Jesup.

- The publication Greenland Harbour Pilot was published in August 2019. The publication so far contains updated information on 36 Greenlandic harbours (towns, settlements and stations).

### 4.2. Updated publications

The Danish Maritime Authority updates the following publication and reports online:

- [Navigation through Danish Waters](#)

The Danish Meteorological Institute updates the following publication and reports online:

- <https://dmi.dk/hav-og-is/temaforside-tidevand/tidevandstabeller-for-danmark/> (Only in Danish)

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)
- Greenland Pilot – Sailing Directions for West Greenland (in Danish/in English)
- Greenland Pilot – Sailing Directions for East Greenland (in Danish/in English)
- Greenland Harbour Pilot (in Danish/in English)
- Greenland Pilot – General information about East Greenland (in Danish/in English)
- Mariners' Routing Guide Baltic Sea: <http://balticsearouteing.dk/plan/>

The Danish Geodata Agency's printed publications:

- Charts and publications catalogue (in Danish)
- Kort 1/INT 1 (bilingual)
- 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:

<https://www.dma.dk/SikkerhedTilSoes/Sejladsinformation/Advarsler/Sider/default.aspx>

Meteorological warnings and forecasts Denmark:

<https://dmi.dk/products-in-english/>

<http://ocean.dmi.dk/anim/index.uk.php>

<http://ifm.fcoo.dk>

Meteorological warnings and forecasts Faroe Islands:

<https://dmi.dk/products-in-english/>

<http://ocean.dmi.dk/anim/index.uk.php>

<http://ifm.fcoo.dk>

Meteorological warnings and forecasts Greenland:

<https://dmi.dk/products-in-english/>

<http://ocean.dmi.dk/anim/index.uk.php>

<http://ifm.fcoo.dk>

## **6. C-55**

State of surveys updated April 2019 (See IHO web page for details.)

## **7. Capacity Building**

### **7.1. New technologies and/or equipment**

New production system (NCPS)

A tender process for acquisition of a new production system was finalized in 2018, with the award of the contract given to GeoInfo with Esri as subcontractor.

One of the main objectives of a new production system is to have one production system for ENCs and paper charts for all of DGA's geographic areas. Today DGA uses Caris in the Danish and Faeroe Island waters and Esri for the Greenlandic waters, which means that DGA needs to maintain two very different systems and does not have optimal use of resources. Another objective is the transition from a file-based system to a data-based production system, hereby minimizing redundancy and manual steps and enhancing the possibilities to develop new products in order to respond to future user needs. In the tender material DGA also stressed the need for a standard system that is as close to a COTS (Commercial off the shelf) system as possible and a system prepared for a data driven production flow.

DGA and the Geoinfo team are currently working on customizing the standard system to GST's needs, designing and implementing workflows, and planning for the migration of data and products. Training of staff is also an important part of the project and is carried out as both in-house and on-line courses. The project is scheduled to be completed by June 2020.

Parallel to the NCPS project, DGA is looking into the organizational change that a new production system will invariably result in.

New Depth Data Management System.

DGA has been using a common depth data management system for Denmark, Faroe Islands and Greenland. The system contains two subunits; a Depth Data Drive and a Metadata Database, which are related by a unique survey ID for each survey.

This way of managing bathymetric data has been considered inefficient given the vision of DGA to become a data driven agency, the exponential increase in bathymetry data volumes and the emergence of new technology. Therefore, a tender process was carried out in 2018 and Teledyne Caris Ltd. was chosen as the software and service provider to carry out the project in collaboration with DGA.

Since September 2018 DGA and Caris have been working together to finalize the design of the system based on Caris Bathy Database COTS software and the migration tools.

Currently, DGA and Caris are working on the development of the migration tools and the customization of the system to archive the desired level of automation that will guarantee efficiency in data handling, quality control procedures and standards compliance while supporting a data driven agency and giving service to all the current and future users of the data.

DGA estimates to have a fully implemented system in September 2019. After this, the migration process will continue until the end of the year in order to have migrated 80% of the most relevant depth data into the new system by the end of 2019. Data with less priority will be migrated afterwards.

The new Depth Data Management System (in Danish Dybde DB) will be operative in 2020.

### **7.2 Capacity building activities**

DGA are planning to host a 6 weeks training course in the autumn 2019 the training course will be targeted new employees in DGA with a focus on IHO and SOLAS rules, depth handling, ENC and paper chart production. DGA are also considering establishing a more structured training course based on the specifications for a full Cat B in cartography.

## 8. Oceanographic activities

### 8.1. Tide gauge network

The Danish Meteorological Institute and other governmental bodies, maintain a network of water level stations spread across Denmark. The data are 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 forecasts are available in Danish and English on several web sites such as:

<https://dmi.dk/dmis-vejrproukter/vandstand/> / (In Danish)

<http://fcoo.dk/>

### 8.2 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](http://www.dmi.dk) and as a graphic interface at <http://fcoo.dk/> The tidal pages from FCOO are available in English.

## 9. Other activities

### 9.1. International

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 e.g. IRCC, HSSC, S100-WG, ENCWG, NCWG, NIPWG, IENWG, CSBWG and DQWG, OGCMDWG and UNGGIM MWG.

DGA hosted the IHO 4th S-100 Working Group meeting, 1st Geospatial Information (GI) Registry Workshop and the 5th S-102 Project Team Meeting in Aalborg between 25th February - 1st March 2019. There were 69 attendees from 22 Hydrographic Offices and a wide range of industry and academic experts. Participants travelled from all over the world including Australia, China, Republic of Korea, Brazil, Canada, USA and from across Europe.

S-100 is important to DGA to ensure that the agency is prepared for the new standards and can continue to provide the best products and services to end users, in particular S-101 Electronic Navigational Charts (ENCs).



Figure 6: The IHO S-100 WG.

Topics for discussion included:

- Interoperability of S-100 products
- Registration of data in the GI Registry
- S-102 – Bathymetric Surface
- Experiences of developing S-100 test products
- Amendments to the S-100 data model
- Data transfer and distribution
- Continual maintenance of S-100 to meet the needs of the wider user community
- Increased Stakeholder engagement

For further information on S-100, please see the IHO S-100 site.

DGA is active in the HELCOM Monitoring Working Group and participates in the newly established OGC Domain WG and the Arctic MSDIWG.

The EU PSI Directive (Reuse of public sector information):

The Danish Geodata Agency has been involved in national meetings with other Danish authorities regarding the draft of the proposed directive for reuse of public sector information. The Danish Geodata Agency has also participated in a meeting with other HO's regarding the influence of the proposed directive. It has been the Danish Geodata Agency's view that the directive would not change the option of charging for nautical charts and nautical data. This because the Danish Geodata Agency is required to generate a substantial part of its revenue by selling products and services.

## 9.2. National

The Danish MSDI

In 2018 the Danish Geodata Agency together with 10 marine agencies (MSDI partners) have been focusing on the future strategy for MSDI. This entails a new governance model for the MSDI together with the preparation of business case for further development of MSDI.

The objective of the current version of the MSDI is to gather authoritative marine data from the 11 authorities; also, the MSDI serves as a tool that makes it easy to get an overview of available data as well as retrieve and use the data on a day-to-day basis. The further development of the Danish MSDI will result in the MSDI being accessible to the public, an increase in the amount of marine geographical data as well as the development of new tools to support the retrieval and presentation of data.

DGA has produced a Business Case for further development of the Danish MSDI. The purpose of the business case was to clarify the benefits of and costs associated with the further development of the MSDI and was based on a three-step development plan (figure 7):

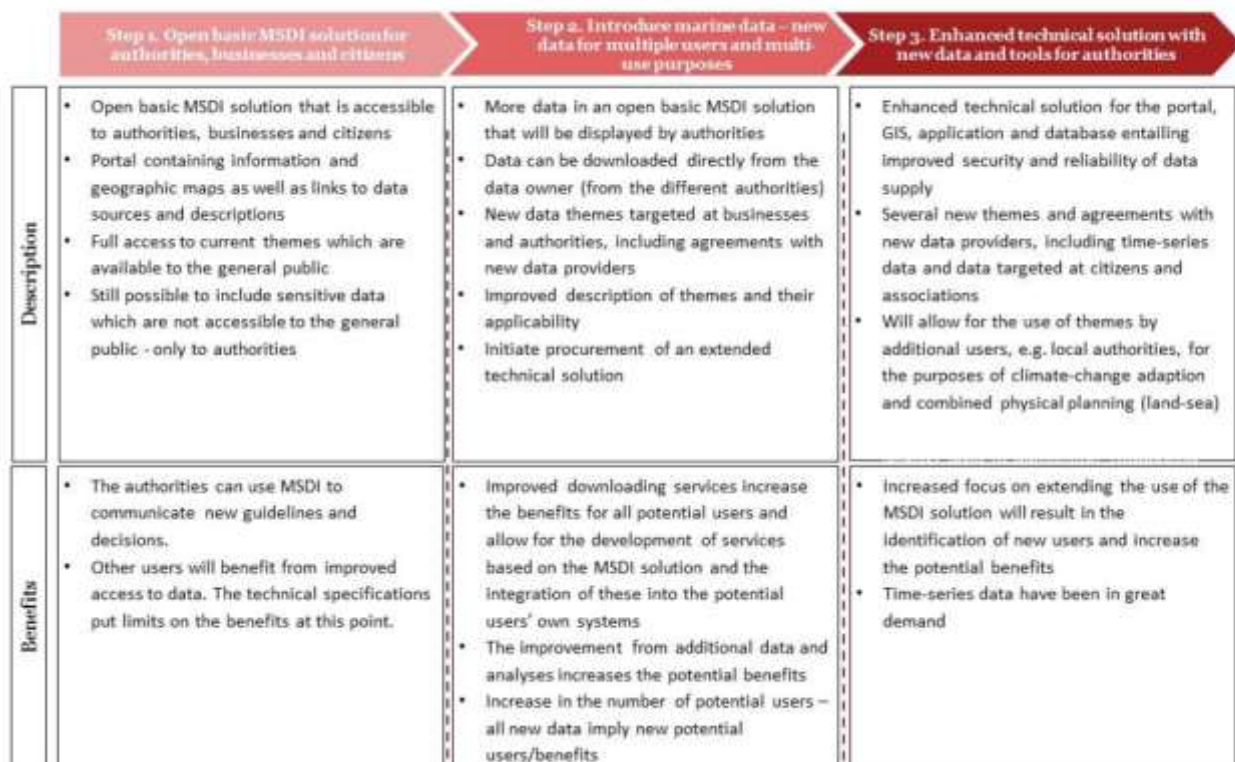


Figure 7: Three-step development plan for the Danish MSDI

The analysis indicated a strong demand for a further development of the Danish MSDI as a free and open data infrastructure for marine data and showed an annual net benefit of DKK 2 million after implementation of the three-step development plan and a positive net value over an 8 year period. In addition, business cases points to a number of qualitative benefits that were not possible to qualify financially, e.g improving authorities communication of decisions, rules and guidelines; new business opportunities for entrepreneurs; improved data accessibility for research; and improvement of recreational apps and maps aimed at citizens.



The aggregated benefits of the development plan supports that an improved MSDI is an important step towards realising the government's growth plan for 'The Blue Denmark' which promotes sustainable growth in the marine sector. It will also be in line with the objective of the Danish government's general 'Digital Strategy 2016-2020', which seeks to create the foundation for a future Digital Public Sector that can support economic growth and new business opportunities.

The Faroe Islands:

On 16th of February 2018, the Faroe Islands announced that they wanted to take over the production of nautical charts and survey of waters around the Faroe Islands. Along with the Danish Ministry of Energy, Utilities and Climate, the Prime Minister's Office and authorities from the Faroe Islands, the Danish Geodata Agency has written a report describing the tasks of mapping the waters. The report contains a description of the future tasks that the Faroe Islands is responsible of, and the tasks that the Danish Geodata Agency will continue to be responsible for. The parliament at the Faroe Islands decided on December 10, 2018 to take over the responsibility 1st of January 2020.

ENC Simple:

DGA has initiated a pilot project ENC-Simple.

ENC-Simple data is compiled for pilot assisted navigational purposes in areas with no coverage of ENCs but where full multibeam surveys have been carried out. Full bathymetric data coverage is not required, but must cover areas intended for navigation and this data must be full coverage multibeam data.

DGA has developed a set of specifications intended to enable Hydrographic Offices to produce a consistent ENC-simple, and manufacturers to use that data efficiently in an ECDIS under supervision of a certified pilot. An ENC-Simple must be produced in accordance with the rules defined in the ENC-Simple Specification. The Danish Navy and the Greenlandic Pilots participates in the pilot project. The ENC-Simple will be tested in 2018 and 2019 for the two areas covering Prins Christian Sound and Skovfjord to Narssarsuaq.



Fig. 8. ENC-Simple produced for Prins Chr. Sound which is very popular destination among the cruise ships

### 9.3. Websites

The Danish Geodata Agency:

<http://www.gst.dk/English/>

<http://www.eng.navigation.gl/>

The Danish Maritime Authority:

<http://www.dma.dk/>

Danish Meteorological Institute:

<http://www.dmi.dk>