

ARHC

National Report of Denmark

July 2022



Executive summary

This report gives a summary of the main activities within the Danish Hydrographic Office since the last report given at the ARHC11 - VTC Meeting 9 - 10 November 2021

1. Hydrographic Office

The Danish Geodata Agency (DGA) is part of the Danish Ministry of Climate, Energy and Utilities. The Ministry consists of the Danish Energy Regulatory Authority, Energinet, the Agency for Data Supply and Efficiency (New name the Agency for Data Supply and Infrastructure), the Danish Energy Agency, the Danish Meteorological Institute

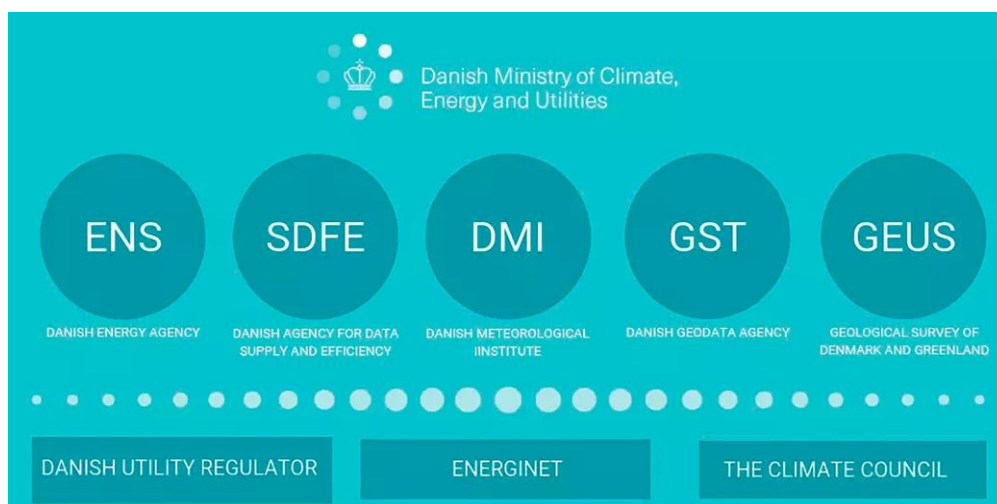


Figure 1. Ministerial institutions.

DGA in its role as a hydrographic office has responsibility for hydrographic surveys and charting in Denmark and Greenland. It is responsible for the production of nautical charts of the waters surrounding Denmark and Greenland, just as the DGA is responsible for the Danish MSDI and represents Denmark internationally within the marine geodata field (MSDI). DGA 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 demarcation of the Danish maritime boundaries. DGA has 142 employees, of which 68 are employed in the hydrographic office. The practical work of hydrographic surveys is carried out by personnel and ships from the Royal Danish Navy (Danish Hydrographic Surveys). Survey personnel from the Navy are part of the organization of DGA.

Umhvørvisstovan has now taken over the responsibility for surveying and mapping the waters around the Faroe Islands.

In the future, on behalf of the Kingdom of Denmark, DGA will still have the responsibility for areas related to foreign, security and defence policy for the Faroese waters. These are e.g. visualization of limits and boundaries in nautical charts, INT charts, nautical charting for the Defence, negotiations in international forums etc. and representing the Kingdom of Denmark in IHO and IHO related work- groups.

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.

Due to Covid 19, most of Denmark has been impacted for long periods in 2021. This has included employees in DGA performing their daily work from home. Quite shortly after the closure of public workplaces, DGA's employees were working online from home, and most of the work could continue as before. DGA has given the employees the possibility to establish more permanent workplaces at home including furniture and IT equipment and support. Generally, the work efficiency has been **increasing on operational tasks and the employee's sickness rate has gone down, whereas strategic development** has been challenged and taken longer than planned.

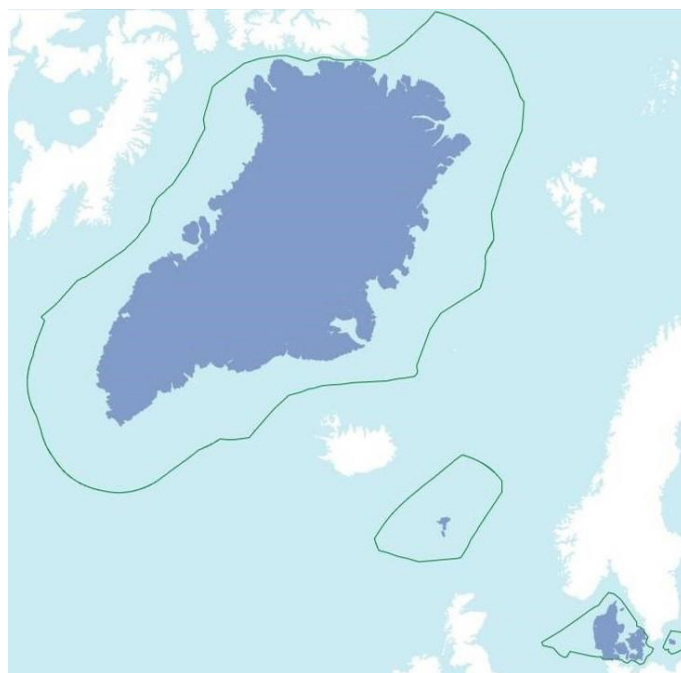


Figure 2. Greenland, Faroe Islands and Denmark.

ORGANIZATION IN THE DANISH HYDROGRAPHIC OFFICE

Head of Department:

- Elizabeth Hagemann
- Niels Tvilling Larsen

Functions:

- SAS – Systems, Application & Support.
- PUK – Processes, Development and Quality Control
- DML – Data Management & -Deliverables
- PAF – Policy, Utilization & Business Development
- SØP – Nautical Chart Production
- SOP – Case Handling and Updating
- Hydro – Depth data manager
- SOM – Hydrographic Surveys

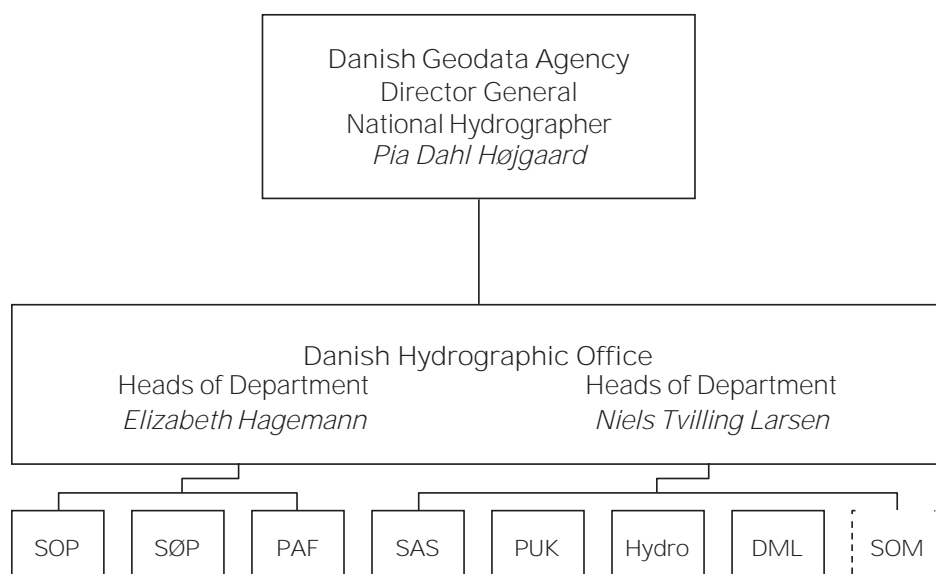


Figure 3. Organization in the Danish Hydrographic Office.

NEW STRATEGY FOR THE DANISH HYDROGRAPHIC OFFICES 2030

DGA has developed a new strategy that runs until 2030. The overall goals reflect the motivation to enhance the production and usage of hydrographic data, services and products for both navigation and to support the production of other marine geospatial products for the benefit of the environment and the society.



Figure 4. DGA Strategy.

Coordination and collaboration of marine data:

Increase the collection of bathymetric data in areas that have not yet been surveyed and in areas with data of low quality, with the intention to enhance the validity of the bathymetric data sets.

Work towards the coordination of arctic marine data.

Update the legal basis for the collection of bathymetric data in Danish and Greenlandic waters.

Efficient production:

Automate repetitive manual tasks. Establish and document procedures throughout the whole production chain. Review and organize internal and external data. Create seamless data where necessary.

Long term finance model:

Funding opportunities and free data

IMO MEMBER STATE AUDIT OF DENMARK

The audit of Denmark was undertaken from 25 October to 8 November 2021, by four auditors drawn from Poland, Sweden, Turkey and the IMO Secretariat. The scope of the audit included the flag, coastal and port State obligations of Denmark in relation to the applicable IMO instruments to which it is party.

The following Danish organizations were involved in the IMO audit:

- Ministry of Environment (MOE)
- Danish Maritime Authority (DMA)
- Danish Geodata Agency
- Danish Meteorological Institute (DMI)
- Danish Maritime Investigation Board (DMAIB)
- Danish Navy Command

The IMO Member State Audit Scheme creates a basis to assess the extent to which a Member State complies with its obligations set out in the various IMO instruments to which it is a party. In addition, the IMO Instruments Implementation (III) Code (resolution A.1070(28)) stipulates a number of principles a Member State should adhere to in order for its maritime administration to deliver on its obligations and responsibilities, with respect to maritime safety and protection of the marine environment, and to be capable of improving its performance in the discharge of its duties.

The audit was conducted remotely. The methodology used was to establish, through a series of remote interviews, examination of written records and databases, the objective evidence, which would determine the extent to which the Administration achieved the objectives.

At the IMO audit, DGA demonstrated that it keeps records, evaluates, and reviews its performance on an annual basis and formulates goals for the coming year. There were no further comments to the work carried out by DGA.

2. Surveys

2.1 Overall status and surveys 2021 (Denmark and Greenland)

The Survey Directive for the Danish waters reflects the decisions taken at the HELCOM Ministerial Council meetings in Copenhagen in September 2001 and October 2013 on the resurvey of the main navigation routes and other areas of interest for shipping in the Baltic Sea and inland Danish waters. Furthermore, CAT III areas are incorporated into the survey plan, as decided by HELCOM ministerial meeting in 2021. The target for surveying in Danish waters in 2021 was to complete 22.000 Km of survey lines in Danish waters. The result was 28,759.4 Km.

The Survey Directive for Greenland is based on the overall priorities of surveying areas in Greenland, which have been agreed with the Government of Greenland.

The overall priorities for surveying in Greenland in 2021 was as follows:

Priority 1.

The inland routes between the cities of **Greenland's** west coast from Nunap Isua (Cape Farewell) to Upernavik.

Priority 2.

Survey of sailing routes in coastal areas on the west coast of Greenland, where the general water depth is less than 200 meters and the basis of survey is insufficient. Examples of priority 2 may be coastal areas where inshore sailing is not possible, due to ice conditions and geography and surveys are of older date or completely missing.

Priority 3.

Surveying areas of particular interest for business and tourism development. Examples of priority 3 areas may be: Selected fjords with frequent visits of cruise ships and areas of impending mining where increased sailing with larger ships is expected.

The target for surveying in Greenland in 2021 was 6.500 km surveyed line. The result was 9943,6 Km.

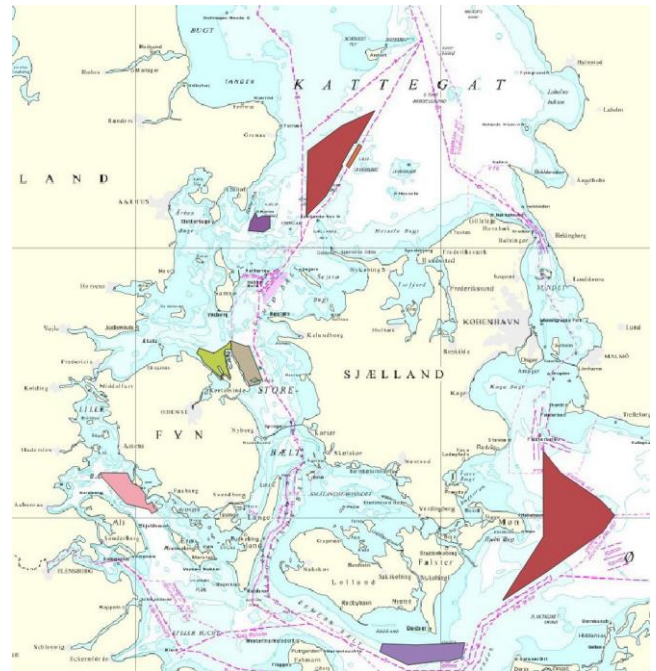


Figure 5: Planned surveys in Danish waters 2020 and 2021.

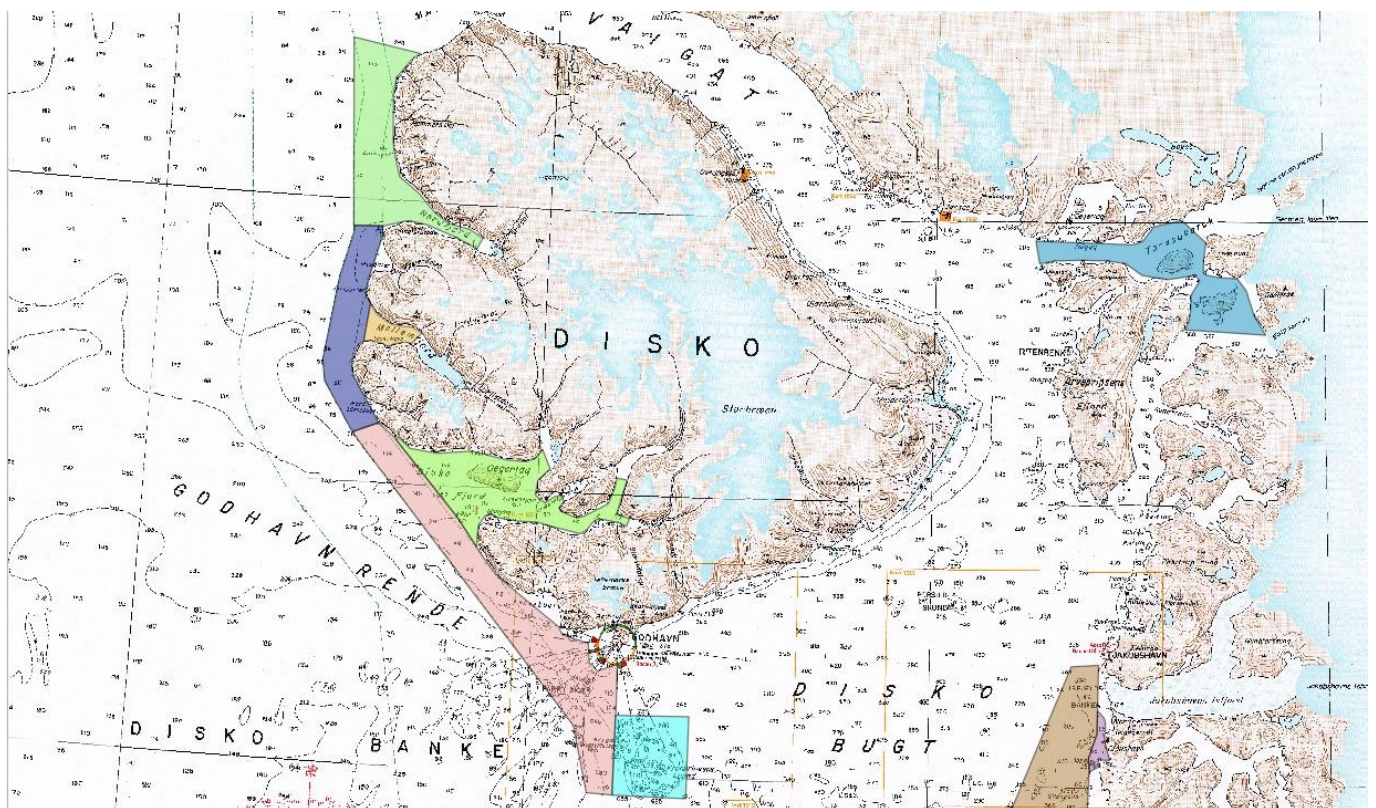


Figure 6: Planned Surveys in Greenland 2021.

2.2 Survey Vessels

The Danish naval survey fleet moved from Copenhagen to the city of Frederikshavn in late 2020.

In connection to the new base port, a calibration target has been established on the seafloor next to the base. The calibration target in Copenhagen remains operational.

Detailed information of the two targets are available for other users at the DGA web site:

New underwater target off Frederikshavn (gst.dk):

<https://eng.gst.dk/about-us/news-archive/2022/new-underwater-target-off-frederikshavn>

The ships used for survey in Denmark:

I / F Poul Løwenørn

(Danish Maritime Authority) The surveying vessel FYRHOLM (Danish Navy)

The surveying vessel BIRKHOLM

(Danish navy)

The survey boats SOM-1 and SOM-2

(Danish Navy)

Surveys were carried out in Greenland waters in June and July, with:

LAUGE KOCH Arctic patrol vessel

(Danish Navy)

The survey boat SAR-3

(Danish Navy)



Figure 7: Danish Navy Arctic patrol vessel Lauge Koch, used for surveys in Greenland.

2.3 Faroese Hydrographic office

The Faroese Hydrographic office has been busy building up capacity in terms of both gathering bathymetry data as well as cleaning and processing the data. The Faroese Marine Research Institute launched a new 54m long research vessel in 2020, the Jakup Sverri. The ship has a multitude of deep ocean research facilities, including a Kongsberg EM712 multibeam system and a Kongsberg PS18 sub-bottom profiler. Staff from the Faroese Hydrographic Office will gather new medium and deep-water bathymetry using these systems. Caris HIPS&SIPS, Base Editor, Paper Chart Composer and S57 Composer have been acquired and are used in the office.



Figure 8: Image of the Jakup Sverri taken from kvf.fo



Figure 9: Image of the EM712 in action using Kongsberg SIS software.

2.4 Depth Database

DGA completed the implementation of DYBDB, a new depth data management system, in early 2020. During the two last years the following activities have been carried out in relation to the new system;

- Migration of the existing depth data corresponding to the Danish and Greenlandic maritime territory. The task resulted in a much higher resource use than expected. At the end of 2021 93% of the Danish data volume was in the new system. Data migration activity has continued during 2021 continues.
- Further development of the automation tools and data model in order to optimize the system performance.
- DGA has initiated production of a Depth model, 50 m grid, average depth covering Danish waters.

DGA expects the new system will increase flexibility in handling a diversity of depth data formattypes, as well as supporting the optimized delivery of depth data and infrastructure for further development of depth data models.

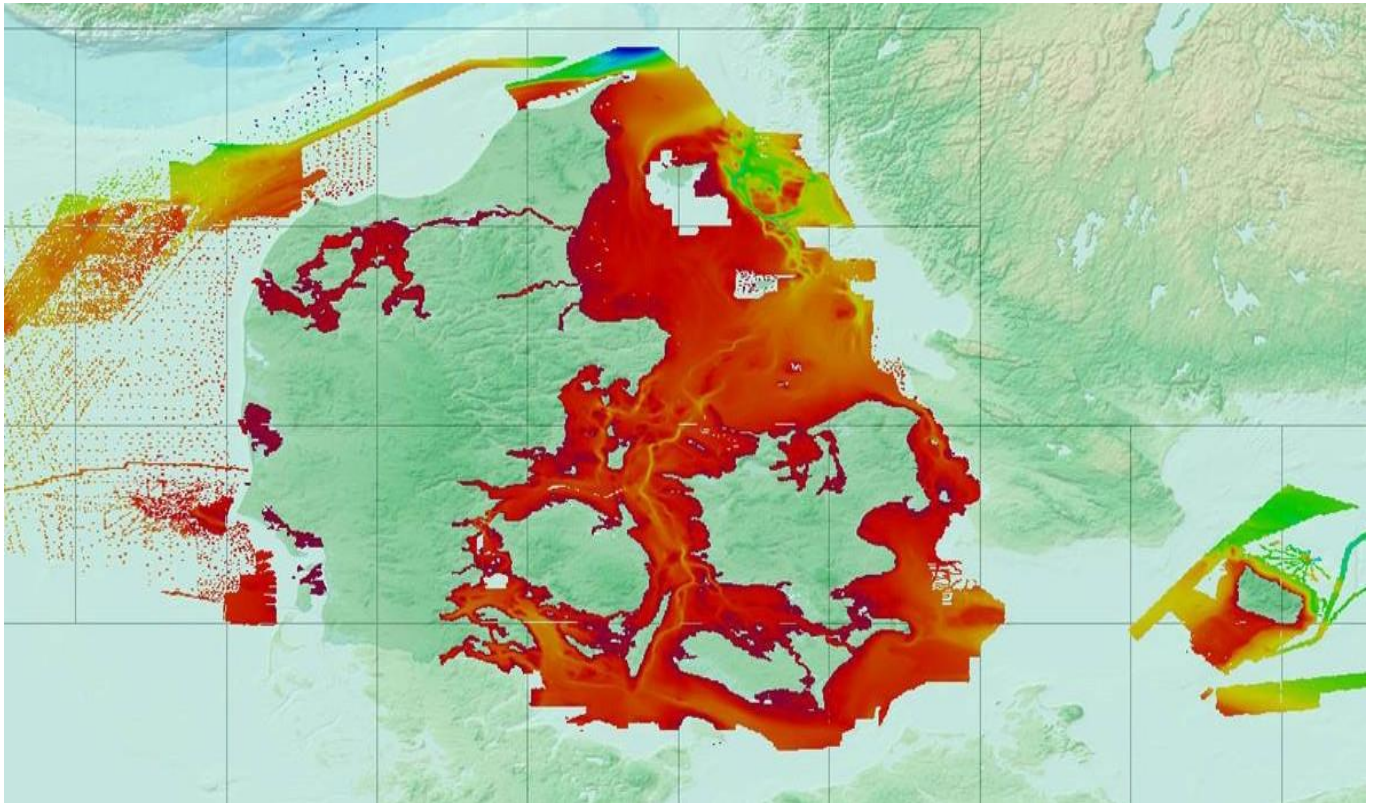


Figure 10: An overview of all the migrated data within the area of Denmark.

2.5 New Technology

Crowd Source Bathymetry (CSB)

DGA is collaborating with research institutions and private industry to implement the Trusted Crowd-Sourced Bathymetry infrastructure as envisioned in a white paper jointly developed with the Canadian Hydrographic Service (see <https://eng.gst.dk/media/2921056/trusted-crowd-sourced-bathymetry-from-the-trusted-crowd-to-the-chart20200621.pdf>).

Satellite Derived Bathymetry (SDB)

Satellite technology and remote sensing are expected to become more prevalent in the future and SDB is a technique that has gained a lot of attention in the recent years. The method uses multispectral sensors and from the images taken by the satellite one can derive parameters like water depths and seabed characteristics. The method has a large coverage and is very cost-effective, but it is also more limited in the depths achieved and object detection.

The plan for 2022 is to buy new high-resolution satellite images and SDB for two new areas on the South and West Coast of Greenland. The purpose is to evaluate if the new high-resolution satellite images and SDB can provide value for optimizing the planning and safety of surveying in the area.

Airborne bathymetric LiDAR

DGA is planning to explore the opportunity for airborne bathymetric LiDAR in Danish territory with execution of pilot project in 2022 for shallow/near shore waters.

Hydrographic survey with autonomous surface vessels

A large part of the Danish maritime territory has not yet been surveyed with modern technology. When including the areas around Greenland, only a small percentage has been surveyed in high resolution.

In collaboration with a Danish company who are developing a multi-sensor system for autonomous navigation, the DGA will in 2022 and onwards launch pilot projects on collecting bathymetric data. With the project, the DGA will autonomously collect bathymetric data in near-shore and offshore areas with a sailing drone. The project will pave the way eventually to operate maritime drones off the coast of Greenland or far from the Danish coast. Introduction of autonomous vessels for hydrographic surveys will enhance the ability to cover larger areas and enhance flexibility.

2.6 The role as depth data manager

In 2019, DGA had the goal to establish the framework for strengthen its role as **Denmark's** depth data manager going forward with the aim of conducting an efficient and value-creating depth data collection, processing and distribution.

DGA has prepared preliminary analysis for Denmark's depth data management, including vision and preliminary objectives. As an essential prerequisite for creating value with depth data, DGA has established a depth database based on CARIS software (see section "Depth Database").

2.7 Implementation of S-44

The new edition of S-44 was implemented in the surveys for 2021 in Danish waters.

Due to more complex tidal systems and lack of knowledge to LAT levels, surveys are not expected to reach "**Exclusive order**" in Greenland.

3. New charts and updates

3.1 New ENC and Paper Charts

All the produced ENCs and updates are distributed through IC-ENC authorized distributors. In 2021 all charts (paper as well as ENCs covering the Danish, and Greenlandic waters) were produced and updated by DGA. Charts covering the Faroes waters was produced and updated by DGA until 1. July 2021 and by US after the 1. July 2021.

Denmark

The portfolio consists of 69 of Danish Paper Charts.

7 new Editions of Paper Charts were published in 2021.

The portfolio consist of 301 Danish ENCs.

491 New Editions (EN) and 538 updates (ER) were published in 2021.

Usage Band	Number of Danish ENCs
1 Overview	1
2 General	9
3 Coastal	6
4 Approach	18
5 Harbour	267

Faroe Islands

The portfolio consists of 8 Faroese Paper Charts. No new editions were published in 2021.

3 New Editions of Paper Charts have been published in 2022..

The portfolio consists of 21 Faroese ENCs.

37 New Editions (EN) and 51 Updates (ER) were published in 2021.

14 New Editions (EN) and 58 Updates (ER) were published first half of 2022

Usage Band	Number of Faroese ENCs
1 Overview	0
2 General	1
3 Coastal	3
4 Approach	16
5 Harbour	1

Greenland

The portfolio consists of 104 Greenlandic Paper Charts.

6 New Editions of Paper Charts were published in 2021.

The portfolio consists of 134 Greenlandic ENCs.

42 New Editions (EN) and 0 updates (ER) were produced in 2021.

Usage Band	Number of Greenlandic ENCs
1 Overview	5
2 General	0
3 Coastal	49
4 Approach	55
5 Harbour	25

3.1.1 ENC's with limited content

Following a successful pilot (ENC Simple) in 2018/2019, the DGA has adopted a new strategy in Greenland to release best quality depth data, necessary for safe navigation in official ENC's.

The aim of the ENC's with limited content is to increase ENC coverage of Greenland and to release best quality depth data, necessary for safe navigation in official ENC's and also to provide a digital foundation for new modern paper charts. These cells include accurate multibeam depth data, a new georeferenced coastline and navigational aids such as lights and beacons. Obstructions and dangers in the multibeam areas, such as cables and pipelines are captured. In areas outside of the multibeam areas, the mariner will need to use existing paper charts. ENC's with limited content are made in areas where there is no existing ENC coverage and the additional data will be added in over time to bring the cells up to full capture content. The cells are available through the usual distribution channels and should be used as any other official ENC.

For further information, please refer to the press release:

<https://eng.gst.dk/about-us/news-archive/2021/more-electronic-nautical-charts-for-greenland-are-on-the-way/>

3.2 Distributions and sale

The Danish Geodata Agency has finished implementing a new licensing agreement aimed towards licensees that create derived products primarily for the leisure craft market. The new agreement has a single fee royalty sum per product sold, and as such deviates from earlier models with percentage based royalty models and area calculations. Other changes include new data protection provisions as well as a requirement for licensees to annually send an ISAE-3000 (High Assurance) report created by an accredited auditor. The first audit reports is expected to be delivered in April 2022.

The following figures show the paper chart and ENC sales from 2015 to 2021.

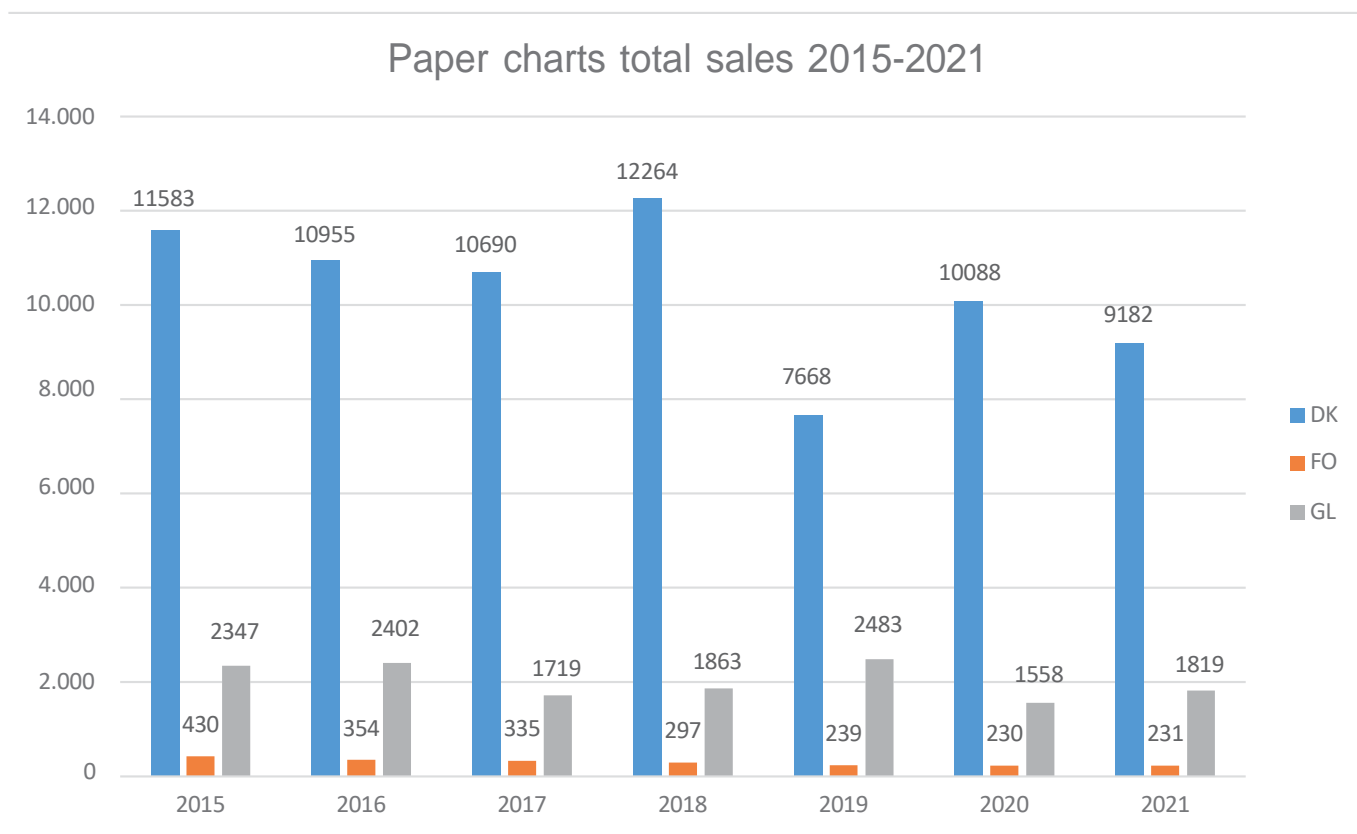


Figure 11: Paper charts total sales 2015-2021.

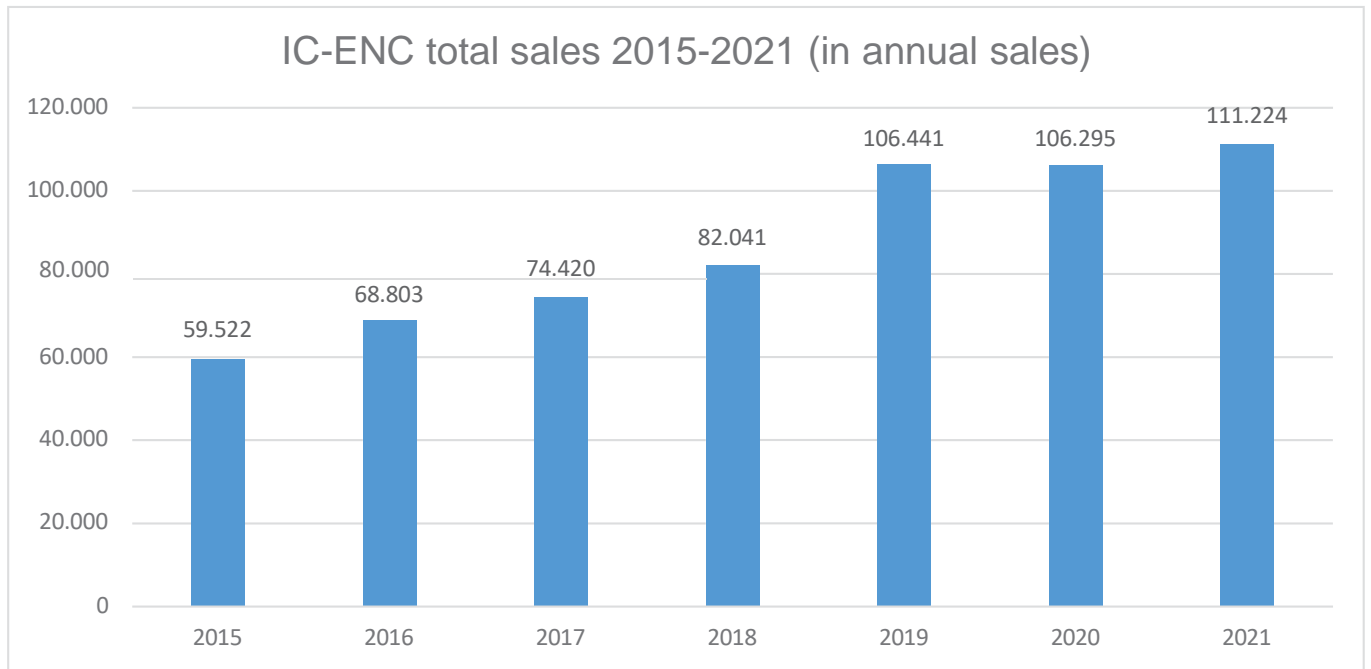


Figure 12: IC-ENC total sales 2015 – 2021 (in annual licenses).

3.3 Nautical Chart Production System – NCPS

Denmark has implemented a new Nautical Chart Production System (NCPS) based on Esri's ArcGIS for Maritime. The system was taken into production in April 2021.

In preparation for the new system, the entire production staff (approximately 40 people) attended 4 weeks of training, split up in two groups. In addition, a Model Office was used to give production staff hands on experience in the production environment and to adjust the system before going into full production

Two weeks after the system was taken into production, DGA was up to date with publishing ENC updates.

DGA now continues to define processes and adjust workflows within the NCPS. Data is also being improved to support a data centric production, so that the benefits of the NCPS can be fully realized.

DGA is also looking into re-scheming of our products and into producing a 1:22.000 base layer in the eastern Danish Waters.

3.4 The Fehmarn Belt Tunnel and nautical charts

In connection with the establishment of a tunnel in the Fehmarn Belt, the construction activities at sea will take place in the period July 2021 to 2027. The construction activities will be carried out along the tunnel's track between Rødbyhavn in Denmark and Puttgarden in Germany.

To protect the construction activities, work areas into which entry is prohibited will be established. Work areas are moved as the construction activities progress. There will be frequent adjustments and relocations of the work areas.

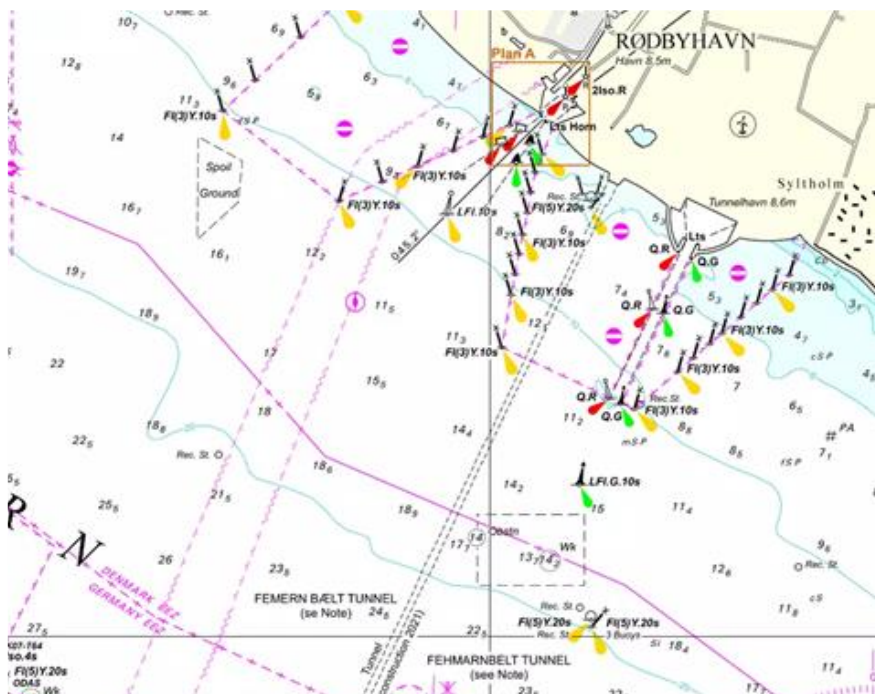


Figure 13: Part of chart 196. Fehmarn Belt

Paper charts

It is problematic for the Danish Geodata Agency (DGA) to present the frequent adjustments and relocations of work areas in the Fehmarn Belt in the paper charts.

For major construction projects, DGA will normally publish the location of work areas using chart blocks in the publication Danish Chart Corrections. With this approach, users will quickly find that there are several blocks inserted on top of each other in the part of the paper chart that covers the area where the tunnel is constructed. Consequently, DGA will have to publish the paper charts of the Fehmarn Belt several times a year. The consequence for users will be the high cost of acquiring paper charts.

DGA has therefore decided that blocks will not be published in Danish Chart Corrections concurrently with adjustments and relocations of work areas are being published in EfS.

The trace of the tunnel is presented in the paper charts. Separate notes regarding the work areas and the Vessel Traffic Service (VTS Fehmarnbelt) are also included in the paper charts.

Electronic Navigational Charts (ENC)

ENC is used by the professional shipping in the ships' Electronic Chart Display and Information Systems (ECDIS).

DGA updates ENC covering the Fehmarn Belt as the location of work areas are adjusted and relocated. The ENC is updated on the basis of the T- and P- notices in EfS, and users will be able to load these ENC updates into the ships' ECDIS on an ongoing basis. As there are frequent adjustments and relocations of the work areas, professional shipping will receive many ENC updates.

Users of ECDIS may find that the location of the work areas in the ENC does not match the actual location of the work areas. There are two reasons for this problem.

The problem stems from the fact that there are delays in several stages, from DGA when have created the ENC updates, to when the ENC updates are received on board the ships.

The problem also stems from the fact that DGA must make the ENC updates on the basis of the T- and P- notices in EfS. For these types of notices, there are uncertainties in relation to start time and duration. The users should compare the information in the T- notices (EfS) on the current location of the work areas with the location of the work areas in ECDIS. The trace of the tunnel is presented in ENC. Separate notes regarding the work areas and the Vessel Traffic Service (VTS Fehmarnbelt) can also be found in the ENC.

4. New publications & updates New publications

4.1. New publications & updates New publications

New version of Kort1 INT1. The publication was published at the end of June 2022.

4.2. Updated publications

The Danish Notices to Mariners (EfS) are available on the website of The Danish Maritime Authority:
<https://dma.dk/safety-at-sea/navigational-information/nautical-information>

The Danish Meteorological Institute updates the tides tables:
<https://www.dmi.dk/hav-og-is/temaforside-tidevand/tidevandstabeller/>

The Danish Geodata Agency publishes a number of publications, which can be found at the DGA website:
<https://eng.gst.dk/danish-hydrographic-office/nautical-publications>

Publication	Formats			Available in English
	Paper	PDF	Digital	
Denmark				
Denmark Harbour Pilot - https://www.danskehavnelods.dk/			X	No
Denmark Pilot - General informations		X		No
Denmark Pilot II	X			No
Greenland				
Greenland Harbour Pilot - https://www.gronlandskehavnelods.dk			X	Yes
Greenland Pilot – General Information about Greenland		X		Yes
Greenland Pilot - Sailing Directions for East Greenland		X		Yes
Greenland Pilot - Sailing Directions for West Greenland		X		Yes
Greenland Pilot - Explanations of the place names		X		Yes
Faroe Islands				
Faroe Islands Pilot	X			No
Faroe Islands Pilot – Appendix 3		X		No
Harbour information for Faroe Islands	X			No
Other				
Kort 1 · INT 1	X	X		Yes
Behind the Nautical Chart		X		Yes
Danish Chart Corrections		X		Yes
Product Catalog		X		No
Mariners' Routing Guide Baltic Sea			X	Yes
Navigation.gl			X	Yes

5. MSI

NAV Warnings are available in English on the following web page:

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

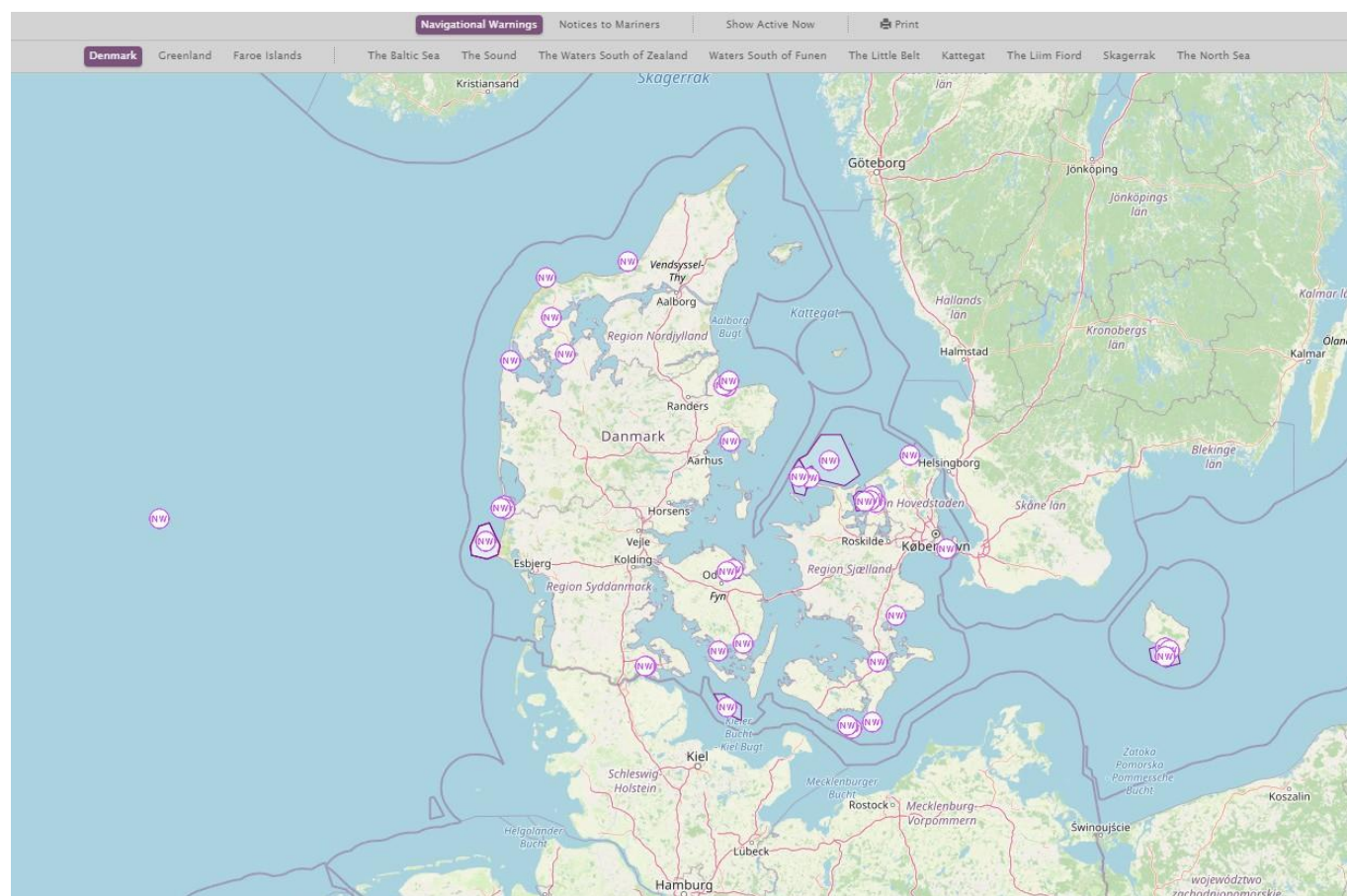


Figure: 14. Navigational warnings Denmark.

6. C-55

C-55 was updated March 2022.

7. Capacity building

Denmark has not been active in the area of capacity building during the period.

8. Oceanographic activities

8.1 Water levels

The Danish Meteorological Institute (DMI) and other governmental bodies maintain a network of water level stations located across Denmark. The collected data are used in several ways: e.g. for safety of navigation, but they also represent an integral part of the national storm surge monitoring and prediction system. Newly collected data is transferred from the stations to the oceanographic database every tenth minute.

Online observations and forecast are available on several web sites (in Danish):

<https://www.dmi.dk/vandstand/>

<https://www.dmi.dk/dmis-vejrpprodukter/vandstand/>

<https://app.fcoo.dk/ifm-maps/select/index.html>

<https://app.fcoo.dk/ifm-maps/select/index.html>

Tides are predicted for Danish, Faroese and Greenland waters, and the tables are updated once a year. In 2021, DMI provided tide forecasts (for 2022) for 187 locations spread across 100 Danish, 76 Greenlandic and 11 Faroese sites. For the Greenland waters, the number of sites with calculated tides has been increased by 7 stations based on water level data collected by the DGA in 2021+2010 (4+1 stations). The data is also used to contribute to the LAToid project. This project - coordinated by the Danish Agency for Data Supply and Efficiency (SDFE) with contributions from DGA and DTU Space - aims to estimate the LAT (lowest astronomical tide) height above the ellipsoid based on satellite altimetry, hydrodynamic modelling and local observations.

Tidal predictions are available in a tabular form on the DMI website: (<http://ocean.dmi.dk/tides>) and through a graphical interface on the Defence Centre for Operational Oceanography for the Greenlandic stations (<https://app.fcoo.dk/ifm-maps/select/index.html>).

9. Marine Spatial Data Infrastructure in Denmark

DGA is responsible for the Danish MSDI, which gathers around 100 authoritative marine datasets from 11 marine authorities and serves as an intergovernmental tool for viewing of marine data as well as access to the data on a day-to-day basis.

In Denmark, there is an increased demand for open and easy access to governmental spatial data, including marine data. To support the increased demand, DGA established public access to the main parts of the Danish MSDI in April 2021.

DGA continuously works to increase the amount of marine spatial data on the MSDI Map viewer – Det Marine Danmarkskort MSDI-kortviewer - and to incorporate data from new data providers.

On the long term, DGA will look into development of new tools, e.g. to support retrieval and presentation of dynamic data, including time series

DGA has also supported the Danish Maritime Authority (DMA) in the process of drafting the first Danish Maritime Spatial Plan (MSP), which will be the first legally binding digital plan in Denmark.

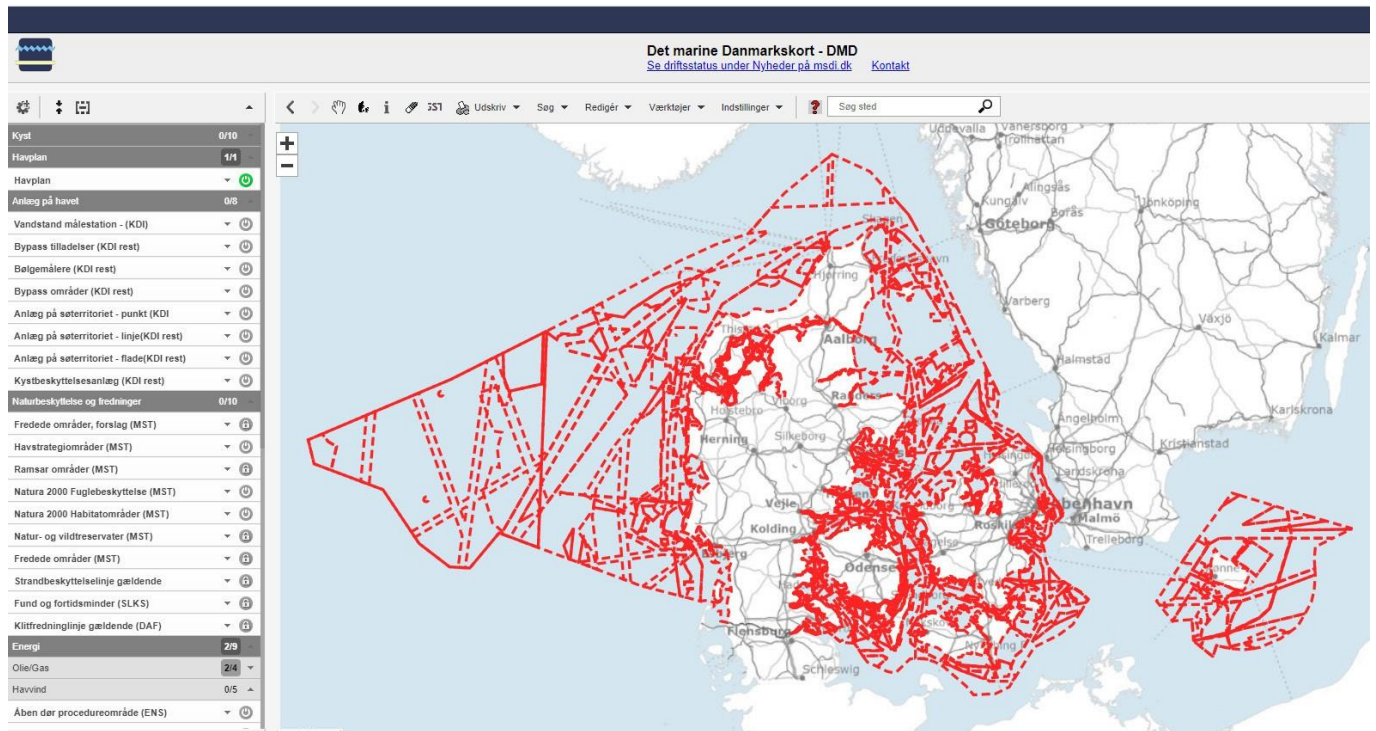


Figure: 15. The Danish MSDI Map viewer with MSP data.

10. Innovation

New distribution platform

For the past few years, DGA has been working on implementing a new depth database and a new chart production system in order to be data driven. To support this the DGA will build a comprehensive data distribution platform for efficient data flows. The distribution platform must be able to support all data flow from receiving data to the users are able to receive the desired marine data and charts. During 2021, the DGA has worked out the components the distribution platform will consist of.

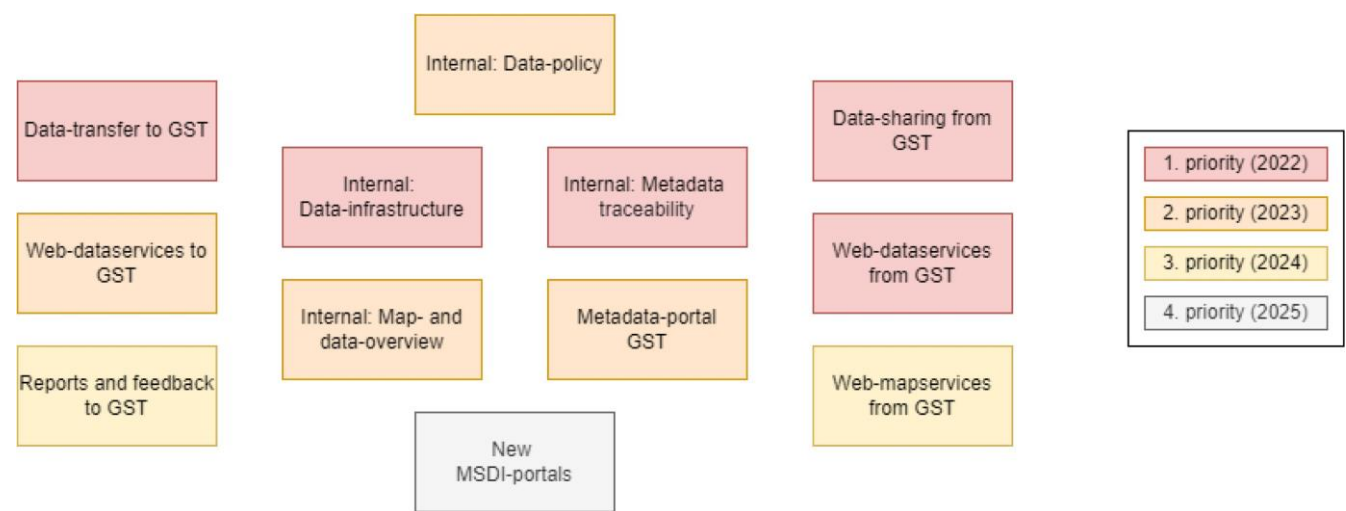


Figure: 16. Overview of the new distribution platform.

DGA wants to use open standards and easily accessible IT tools with high IT security, as the agency works with protected data, which is of great importance for ship traffic. DGA employs its own IT developers to build and maintain a clear and secure Data infrastructure with secure Data-transfer to DGA and Data-sharing from DGA for survey-data. When building the Data infrastructure, it will be taken into account that several types of data sources can be worked on and data can be delivered in the new S-100 format. Traceability and history for data flow must be established throughout the office's value chain - the goal is for data used in charts to have information about the data source and which data transformations have been carried out. It is important that Data policy is formulated and complied, so that there is secure handling of and access to data and not least the quality of data is clearly described, which is the basis for data to be stored and used correctly. The ambition is to establish an efficient platform that can handle large survey data, data services and other forms of feedback to the agency's data, so that Marine data and charts can be updated as soon as possible. Using the latest technologies from OGC Api and ESRI, DGA wants to be able to share and exhibit marine data and charts via other authorities and partners, also via new MSDI portals.

In the figure, the colours of the components indicate the order in the development of the components with the latest implementation of the first elements in the specified years.

Other relevant activities are described under item 2.4 New Technology.

11. Other activities

11.1 International 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) and has the vice chairmanship for the S-100 Working Group and the ENC Working Group.

DGA also participates in the newly established IHO Hydrographic Surveys Working Group (HSWG) and the Tides, Water Level and Surface Currents Working Group (TWCWG).

The Danish Geodata Agency has been involved in the work done by e.g. IRCC, HSSC, S100-WG, ENCWG, WENDWG, NCWG, NIPWG, IENWG, CSBWG, DQWG, OGCMDWG, HDWG and UNGGIM MWG.

Seabed

2030

The GEBCO Seabed 2030 project will facilitate mapping of the ocean floor by the year 2030. The aspiration is to compile all available bathymetric data into a high quality, high-resolution digital model and to promote international efforts to collect new data. Denmark will support this initiative mainly by submitting gridded bathymetry.

11.2 Arctic activities

Dundas mining project and other upcoming mining projects in Greenland

In connection with the development of a new mining project near Dundas in the north-western part of Greenland DGA has produced a number of ENCs and published consequence corrections to the paper charts. The ENCs which include updated coastline and primarily existing depth information, covers the key seaward approach & coastal waters for the Dundas mining project. The ENCs have been made commercially available and they provide a key dataset for future safe shipping operations.

In 2021, DGA have also been in dialogue with other mining companies relating to surveying- and charting requirements necessary for the future development of two new mining projects near Fiskenæsset in SW Greenland and at Citronen Fjord in North Greenland.

Prioritization of future charting of Greenland after 2026

In 2021, the DGA has carried out user surveys in dialogue with the National Defense, the Nautical Committee in Greenland and the Greenland Government to get input on a prioritization of which areas are to be surveyed and charted after 2026, where the current charting of the area between Cape Farewell and Upernavik is expected to be completed. The remaining area is huge and there is a general lack of depth data and updated charts, which is why a prioritization of areas is important. DGA expects to have a long-term surveying and charting plan ready in 2022.





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