



BALTIC SEA  
HYDROGRAPHIC  
COMMISSION



# BSHC29\_C3\_CDWCWG\_Presentation-SE

29<sup>th</sup> BSHC Meeting  
17-19 September 2024  
Tallinn, Estonia

Thomas Hammarklint



# Objectives

1. Status of CDWCWG work: Meeting 2024 / Implementation status 2024
2. CDWCWG Member List
3. CDWCWG Terms of Reference
4. CDWCWG Work Programme
5. Future Maritime Services S-100 with examples of S-104 and S-111
6. How member states benefits best of CDWCWG
7. Actions requested from the BSHC29 Conference



# 1. Status of CDWCWG work: Meetings / Implementation status

## BSHC29 C3 SE CDWCWG Report

Since the BSHC 22<sup>nd</sup> Conference 2017, *Mr Thomas Hammarklint* has acted as Chair.

The new name of the working group were approved at the last BSHC Conference ([BSHC28](#)): Chart Datum, Water level and Currents Working Group ([CDWCWG](#)). The last working group meeting ([CDWCWG1 Chair's Report](#), [Minutes](#)) was held 26-27 March 2024 in Helsinki, Finland. [16 delegates](#) attended the meeting. The main objectives of the CDWCWG 1<sup>st</sup> meeting was to review the [National implementation status](#) and coordination of the [Baltic Sea Chart Datum 2000](#), S-104 Water Level and S-111 Surface Currents in the Baltic Sea ([CDWCWG Roadmap](#)), follow up the [List of Actions](#) from the last meeting, [TORs](#), [Work Programme](#) and coordinate our work.

BSCD2000 have been registered as chart datum 44 in [IHO Geospatial Information Registry](#).

An [article on the Baltic Sea Chart Datum 2000](#) has been published in the International Hydrographic Review ([IHR](#)) in May 2020.

The first release of the BSCD2000 Height Transformation Grid (Geoid Model) was done in November 2023.

A [release note](#) has been published in IHR in November 2023.

The CDWCWG work have been or will be presented at the following meetings and conferences in 2023-2025:

- BSHC CDWG14, 28-29 March 2023, Göteborg, Sweden
- BOOS Annual meeting, 9-11 May 2023, Helsinki, Finland
- BSHC28, 19-21 September 2023, Helsinki, Finland
- TWCWG8, 20-22 February 2024, VTC
- Kartdagarna, 16-18 April 2024, Göteborg, Sweden
- BSHC29, 17-19 September 2024, Tallinn, Estonia
- NSHC TWG27, 4-5 February 2025, Taunton, UK
- Kartdagarna, 8-10 April 2025, Skellefteå, Sweden
- BSHC30, 22-24 September 2025, Riga, Latvia
- NSHC TWG25, 7 February 2023, VTC
- EUREF Symposium, 23-26 May 2023, Göteborg, Sweden
- NSHC TWG26, 6-7 February 2024, Göteborg, Sweden
- BSHC CDWCWG1, 26-27 March 2024, Helsinki, Finland
- BOOS, 6-8 May 2024, Copenhagen, Denmark
- TWCWG9, 19-22 November 2024, Monaco
- BSHC CDWCWG2, 25-26 March 2025, Tallinn, Estonia
- BOOS, 2-4 June 2025, Sopot, Poland
- TWCWG10, 4-7 November 2025, TBC

The [CDWCWG Website](#) have been updated with a lot of new information.

# Chart Datum, Water level and Currents Working Group (CDWCWG)

## Chart Datum, Water level and Currents Working Group (CDWCWG)

"To implement a common reference system, S-104 and S-111 in the Baltic Sea"

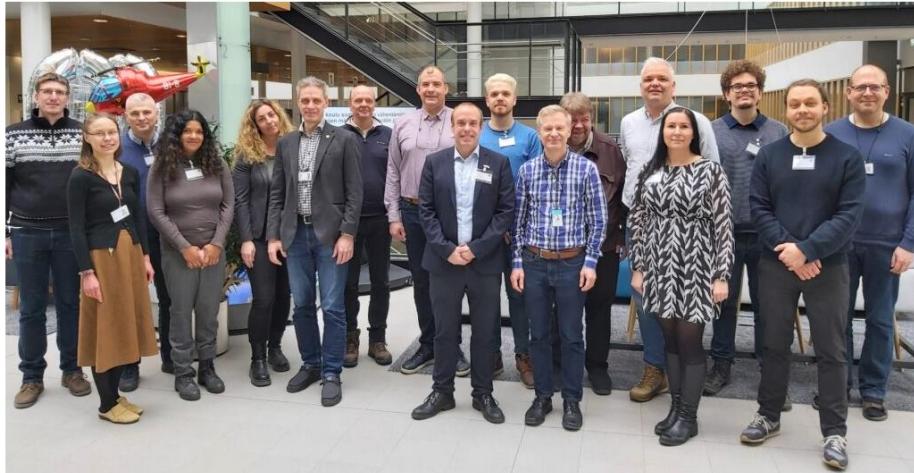


Photo: Chart Datum, Water level and Currents Working Group 1st meeting, 26-27 March 2024, Helsinki, Finland

<https://www.bshc.pro/working-groups/cdwcgw>

### Members of CDWCWG:

|           |                                |
|-----------|--------------------------------|
| Denmark   | Mr Nikolaj Møller              |
| Denmark   | Mr Kristian Villadsen Kristmar |
| Estonia   | Mrs Gabriela Kotsulim          |
| Finland   | Mr Jyrki Mononen               |
| Finland   | Mrs Anni Jokiniemi             |
| Germany   | Dr Patrick Westfeld            |
| Latvia    | Mr Bruno Špēls                 |
| Lithuania | Mr Mindaugas Zakarauskas       |
| Poland    | Mr Witold Stasiak              |
| Poland    | Mrs Alicja Olszewska           |
| Russia    | Mr Leonid Shalnov              |
| Russia    | Dr Sergey V. Reshetniak        |
| Sweden    | Mr Thomas Hammarklint (Chair)  |
| Sweden    | Mr Henrik Tengbert             |

### Observers and Experts:

|           |                                    |
|-----------|------------------------------------|
| Estonia   | Prof. Artu Ellmann                 |
| Estonia   | Dr Sander Varbla                   |
| Estonia   | Dr Nicole Camille Delpeche-Ellmann |
| Finland   | Mr Jarmo Mäkinen                   |
| Finland   | Dr jani Särkkä                     |
| Finland   | Dr Mirjam Bilker-Koivula           |
| Finland   | Dr Timo Saari                      |
| Germany   | Dr Gunter Liebsch                  |
| Germany   | Dr Joachim Schwabe                 |
| Latvia    | Mr Armands Murans                  |
| Latvia    | Mr Krists Dzenis                   |
| Lithuania | Mr Emelis Tertelis                 |
| Lithuania | Mr Romuald Obuchovski              |
| Norway    | Mr Aksel Voldlund                  |
| Poland    | Mr Krzysztof Pyrcha                |
| Poland    | Mrs Małgorzata Pająk               |
| Poland    | Dr Monika Wilde-Piórko             |
| Poland    | Dr Małgorzata Szelachowska         |
| Sweden    | Dr Jonas Ågren                     |
| Sweden    | Dr Per-Anders Olsson               |
| Sweden    | Mrs Johanna Linders                |



# Implementation status Baltic Sea 2024

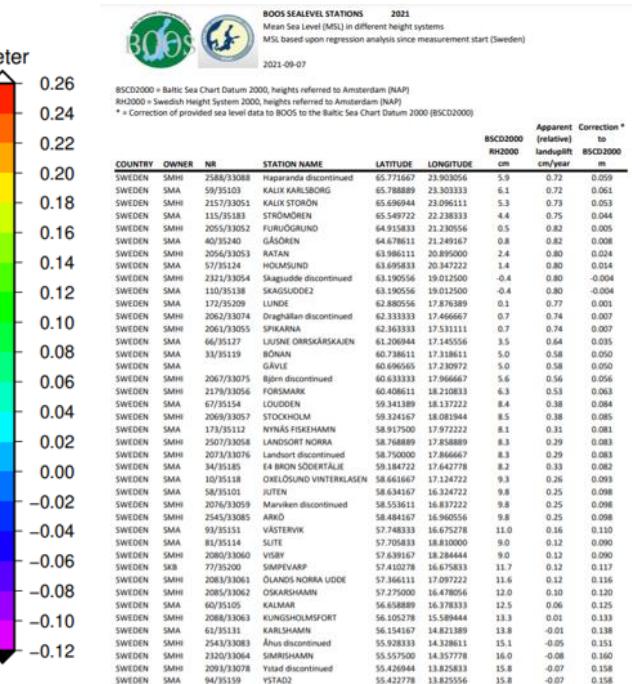
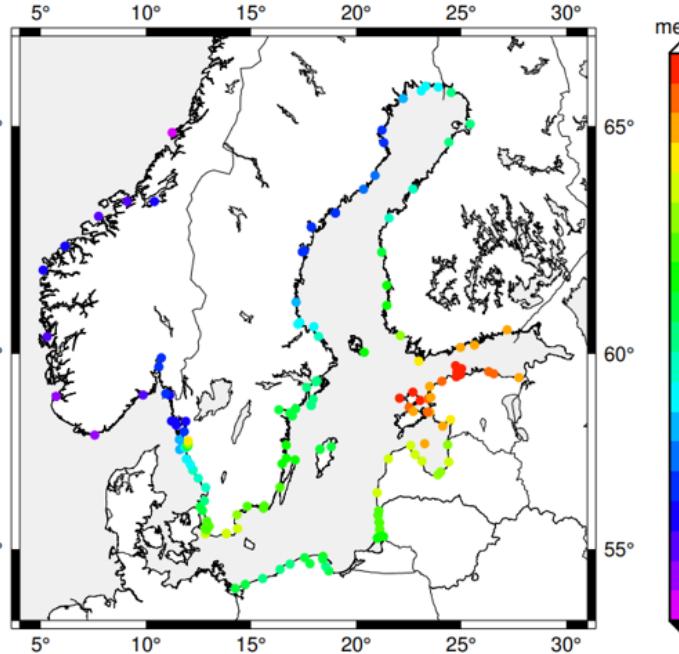
## Summary implementation of BSCD2000, S-104 and S-111 status 2024:

| Country                   | Status BSCD2000 for charts  | Status BSCD2000 for water level (see <a href="#">mwreg_boos</a> )  | Status S-104/S-111   |
|---------------------------|---|--|--|
| <a href="#">Denmark</a>   | Chart datum in practice close to EVRS-based chart datum (DVR90). BSCD2000 is implemented in ENC and will be implemented in paper charts in the order of reprinting.   | All Danish water level stations are connected to DVR90 (BSCD2000). <a href="#">Data distributed to BOOS/CMEMS in relation to DVR90</a> . Responsibility of Danish Meteorological Institute (DMI), Danish Coastal Authority (Kystdirektoratet) and Danish Environmental Protection Agency (Miljøstyrelsen).   | DMI and FC00 (Forsvaret Center for Operativ Oceanografi) is responsible for water level and current information. Aim to have a plan for S-104 and S-111 in 2024.<br>DGA and DMI coordinates the work.              |
| <a href="#">Estonia</a>   | All decisions are taken and the implementation is ongoing. Official use in charts and water level information from 2018-01-01. <a href="#">Notices to Mariners 2022-12-01 Info Sheet</a> . Web application <a href="#">Nutimeri</a> displays Estonian Transport Administration's official electronic navigational charts.   | All Estonian water level stations are connected to EH2000 (BSCD2000). <a href="#">Data distributed to BOOS/CMEMS in relation to BH577 (old system)</a> . The difference between BH577 and EH2000 reaches up to 26 cm in the Gulf of Finland.<br>Responsibility of Taltech Marine Systems Institute (MSI) and Estonian Environmental Agency (EEA).  | Discussions are ongoing between EMA and MSI. MSI and EEA are responsible for water level and current information.<br>EMA coordinates the work.   |
| <a href="#">Finland</a>   | Ongoing. All decisions are taken already in 2008 and 2015. Approach charts from Tornio to Vaasa have been published. <a href="#">The publication status of N2000 charts</a> and <a href="#">Finnish nautical charts portfolio</a> . <a href="#">New video</a> about the N2000 fairway and nautical chart reform.  | Water level information provided in both systems, mean sea level (MSL) and N2000 (BSCD2000). The differences between MSL and N2000 is provided as a <a href="#">Table</a> . Water level observations and forecasts will be available in N2000 for the public simultaneously with Traficom nautical charts. <a href="#">Data distributed to BOOS/CMEMS in relation to MSL</a> .<br>Responsibility of Finnish Meteorological Institute (FMI).                    | The first test products of S-104 and S-111 will be created by FMI in the Baltic Sea e-Nav-project until 2026. FMI is responsible for water level and current information.<br>Traficom and FMI coordinate the work. |
| <a href="#">Germany</a>   | EVRS realization in use in practice. The vertical chart datum of BSCD2000 is close to the national height system of Germany (ETRS1989+DHNN2016). All published products will refer to this datum. In August 2021, BSCD2000 was officially introduced as <a href="#">chart datum for German waters in the Baltic Sea</a> . The official introduction was decreed in January 2018 and is binding for all institutions coming under the jurisdiction of the Federal Waterways and Shipping Administration (WSV). | All German water level stations refers to the national height system DHNN2016 (BSCD2000). <a href="#">Data distributed to BOOS/CMEMS in relation to DHNN2016, but metadata refers to SNN76/Kronstadt (old system)</a> .<br>Responsibility of Federal Waterways and Shipping Administration (WSV).  | BSH is responsible for water level and current information.<br>BSH coordinates the work.   |
| <a href="#">Latvia</a>    | Implementation continues. New national height system LAS-2000,5 (BSCD2000) into use in 2015. LAS-2000,5 to new editions of charts in a following sequence – harbour charts, coastal charts, general charts. Harbour charts are either already implemented to LAS-2000,5 or they are in progress. Differences between BHS-77 and LAS-2000,5 is well known and shown in chart notes.  | All water level stations is connected to LAS-2000,5 (BSCD2000). <a href="#">Data distributed to BOOS/CMEMS in relation to LAS-2000,5</a> .<br>Responsibility of Latvian Environment, Geology and Meteorology Centre (LVGMC).   | Meeting between MAL and LVGMC officials has been held about S-104 and S-111.<br>MAL coordinates the work.  |
| <a href="#">Lithuania</a> | National height system LAS-07 (BSCD2000) came into force 2016-01-01. BHS-77 still used. The difference between BHS-77 and LAS-07 is well known (about 13 cm) and is also written in nautical charts.  | All water level stations is connected to LAS-07 (BSCD2000). <a href="#">Data distributed to BOOS/CMEMS in relation to BHS-77 (old system)</a> .<br>Responsibility of Lithuanian Hydrometeorological Service (LHMS).  | Data owner has been identified. LHMS is responsible for water level information and Klaipeda University (KU) for currents.<br>LTSA coordinates the work.   |
| <a href="#">Poland</a>    | A written decision was issued by HOPN in July 2021 - Guidelines and timetable for the implementation of PL-EVRF2007-NH (BSCD2000). Bathymetric data transferred to the vertical reference system PL-EVRF2007-NH. Information campaign about the new chart datum. 2021 and onwards new editions of all INT harbour, approach and coastal charts.   | All water level stations is connected to PL-EVRF2007-NH (BSCD2000). <a href="#">Data distributed to BOOS/CMEMS in relation to Amsterdam NN55, but metadata refers to BH577</a> . The difference between the NN55 and PL-EVRF2007-NH is less than 9 cm.<br>Responsibility of Institute of Meteorology and Water Management (IMGW-PIB).  | Agreement with IMGW and Institute of Oceanology of the Polish Academy of Sciences (IOPAN) to provide observed and modelled water level and surface currents data, respectively.<br>HOPN coordinates the work.      |
| <a href="#">Sweden</a>    | Ongoing. All decisions are taken. Many charts (ca 50%) already published. Implementation is a part of the "Chart Improvement Project", to be concluded at the latest in 2030. Information campaigns are ongoing for ports, pilots and other interested parties. <a href="#">Notices to Mariners 2019-05-15</a> . Several articles written in magazines and on webpages.   | All water level information is presented in relation to RH2000 (BSCD2000), since 2019-06-03. Some applications can also present data in relation to mean sea level (MSL). The differences between MSL and RH2000 is provided in this <a href="#">Table</a> . <a href="#">Data distributed to BOOS/CMEMS in relation to BSCD2000</a> .<br>Responsibility of Swedish Maritime Administration (SMA) and Swedish Meteorological and Hydrological Institute (SMHI). | Discussions started between SMA and SMHI. SMA take part in the BS e-Nav-project in cooperation with FMI on this. We will investigate this in 2024 and take further actions in 2025.<br>SMA coordinates the work.   |

2024-03-26



# Reference levels in the Baltic Sea



Reference levels used in the Baltic Sea and differences with respect to the Baltic Sea Chart Datum 2000 (BSCD2000). In Sweden and Finland, the old reference levels are equal to Mean Sea Level (MSL) transferred to year 2025 (according to different national conventions). The values from Norway shows the MSL over the period 1996-2014, relative NN2000/BSCD2000. In Estonia, Latvia and Lithuania, the Kronstadt datum was previously used as chart datum. In Poland, the local Polish Height System Amsterdam NN<sub>55</sub> was used as chart datum. Notice how postglacial rebound reduces the magnitude of the MSL in the Bay of Bothnia. The values are shown in this [Table](#).

# Baltic Sea Chart Datum 2000 (BSCD2000)

## ➤ Definition:

The datum refers to each Baltic country's realization of the European Vertical Reference System (EVRS) with land-uplift epoch 2000, which is connected to the Normaal Amsterdams Peil (NAP).

## ➤ Justification:

The Baltic Sea is an international shallow, non-tidal area in the northern part of Europe with dense traffic. IHO BSHC has approved the name and the adoption of the Baltic Sea Chart Datum 2000 ([specification](#)).

## ➤ Height systems used as national realization of BSCD2000 (EVRS-based):

|                       |                 |                  |
|-----------------------|-----------------|------------------|
| Sweden RH2000         | Denmark DVR90   | Germany DHHN2016 |
| Poland PL-EVRF2007-NH | Lithuania LAS07 | Latvia LAS2000,5 |
| Estonia EH2000        | Finland N2000   | Norway NN2000    |

## ➤ Chart datum name to be shown in paper charts:

Mean Sea Level (Baltic Sea Chart Datum 2000<sup>national realization name</sup>)

Mean Sea Level (Baltic Sea Chart Datum 2000)

Baltic Sea Chart Datum 2000<sup>national realization name</sup>

Baltic Sea Chart Datum 2000

BSCD2000 (national realization name)

BSCD2000

CHART DATUM: Mean Sea Level (Baltic Sea Chart Datum 2000<sup>RH2000</sup>)

REFERENSNIVÅ: Medelvattenyta (Baltic Sea Chart Datum 2000<sup>RH2000</sup>)

SYMBOLS and ABBREVIATIONS: see INT 1

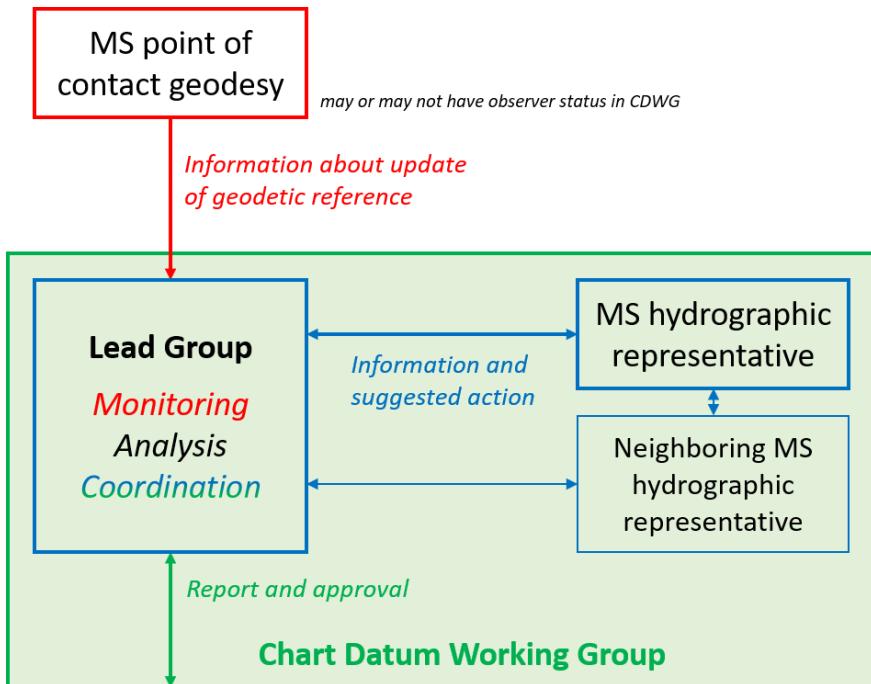
BETECKNINGAR och FÖRKORTNINGAR: se KORT 1

Referensnivå



# Continuity Management of BSCD2000

## Organizational scheme and workflow



## BSCD2000 Height Transformation Grid (Geoid Model)

### Release note:

<https://doi.org/10.58440/ihr-29-2-n11>

### Landing page:

<https://www.bshc.pro/ihc-bscd2000>

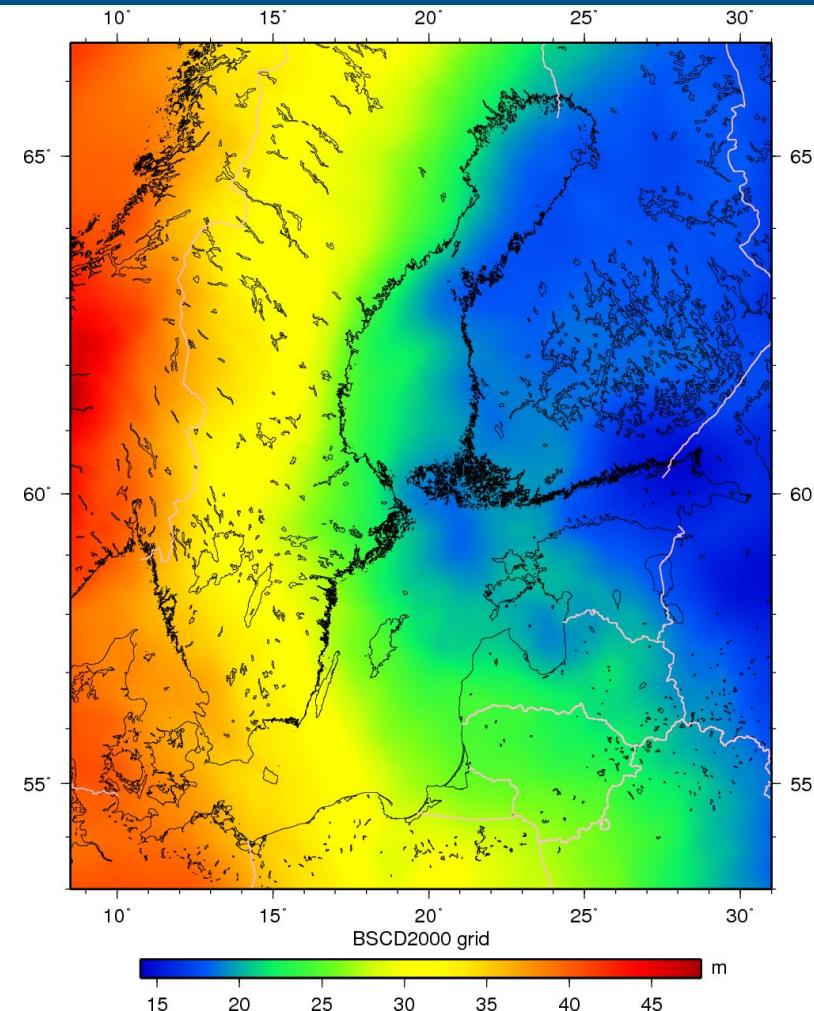
## Digital Object Identifier (DOI) with download

DOI: 10.58440/ihc-bscd2000

URL: <https://doi.org/10.58440/ihc-bscd2000>

The DOI has been configured as type 'database'. In perspective, we can assign any number of "datasets" to a "database". This means that each new BSCD2000 release can have its own entry.

We can also assign literature references (definition, specification, publications etc.) in the future.



# International Hydrographic Review Article

An article about the CDWG work and the implementation of the Baltic Sea Chart Datum 2000 has been published in the International Hydrographic Review (IHR) in May 2020: [THE BALTIC SEA CHART DATUM 2000 \(BSCD2000\) - Implementation of a common reference level in the Baltic Sea](#)

INTERNATIONAL HYDROGRAPHIC REVIEW  
MAY 2020  
Articles

**THE BALTIC SEA CHART DATUM 2000 (BSCD2000)**  
Implementation of a common reference level in the Baltic Sea  
By J. Schwabe<sup>1</sup>, J. Ager<sup>2</sup>, G. Liesch<sup>1</sup>, P. Westfeld<sup>3</sup>, T. Hammink<sup>1</sup>,  
J. Mönchen<sup>3</sup> and O. B. Andersen<sup>4</sup>

1. Federal Agency for Cartography and Geodesy (Germany)  
2. University of Gävle (Sweden) and Lantmäteriet, the Swedish mapping, cadastral and land registration authority (Sweden)  
3. Federal Maritime and Hydrographic Agency (Germany)  
4. Swedish Maritime Administration (Sweden)  
5. Finnish Transport Agency (Finland)  
6. DTU Space (Denmark)

**Abstract**  
The Baltic Sea Chart Datum 2000 (BSCD2000) is a geodetic reference system adopted for Baltic Sea hydrographic surveying, hydrographic engineering, nautical charts, navigational publications and water level information. It is based on the common geodetic standards for the height system (EVRS) and the spatial reference system (ETRS89) in Europe. In particular, the zero level of BSCD2000 is in accordance with the Normaal Amsterdams Peil (NAP). BSCD2000 is about to be adopted as unified chart datum by all the countries around the Baltic Sea. It agrees with most national height realizations used at sea. BSCD2000 will facilitate effective use of GNSS methods like GPS, GLONASS and Galileo for accurate navigation and hydrographic surveying in the future.

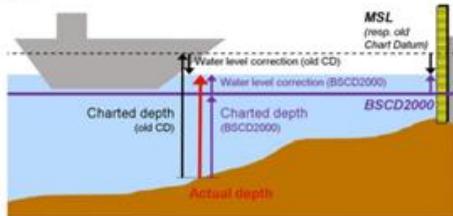
**Résumé**  
Le Baltic Sea Chart Datum 2000 (BSCD2000) est un système de référence géodésique adopté pour les levés hydrographiques, l'ingénierie hydrographique, les cartes marines, les publications nautiques et les informations sur le niveau de l'eau de la mer Baltique. Il est basé sur les normes géodésiques communes au niveau de la hauteur (EVRS) et au Système de Référence Terrestre Européen (ETRS89). En particulier, le niveau zéro du BSCD2000 est conforme au Normaal Amsterdams Peil (NAP). Le BSCD2000 est sur le point d'être adopté en tant que niveau de référence des cartes marines par l'ensemble des pays bordant la mer Baltique. Il correspond à la plupart des mesures de hauteur nationales utilisées à terre. Le BSCD2000 facilitera l'utilisation efficace des méthodes GNSS comme le GPS, GLONASS et Galileo pour une navigation et des levés hydrographiques précis à l'avenir.



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**4. Practical implications**  
New nautical products that use BSCD2000 are identified by the chart datum name BSCD2000<sup>(\*)</sup>, where <sup>(\*)</sup> denotes the respective national height system realization according to [Table 2](#) (e.g. BSCD2000<sup>(NAP)</sup> for Sweden).

The main consequence for the mariner is that the charted depth in BSCD2000 changes by a constant value compared to the old zero level. The offset is individual per country or per map sheet, depending on the former MSL-related chart datum. In most cases, this offset will be negative, since the new zero level of the BSCD2000 is in general below the present day MSL for the Baltic Sea (see [Figure 6](#) for a generalized visualization and [Figure 7](#) for a map of the national MSL realizations currently in use). However, for charts of areas strongly affected by postglacial uplift and referring to very old MSL realizations, the change to BSCD2000 may be considerable. [Figure 1](#) gives an impression of the land uplift rates according to the model NKG2016LU (Vestal et al. 2016).



**Figure 6:** Schematic cartoon of the old MSL-based chart datum and the new BSCD2000

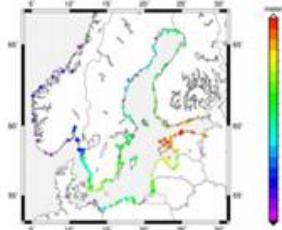
At the same time, real-time water level information (water level observations, corrections to the charted depths, forecasts, etc.) will also be changed accordingly to comply with the new chart datum. This also allows for a better and easier monitoring and prediction of the current and future sea states out at sea, since real-time oceanographic models can be simply interpolated ([Figure 8](#)), whereas switching between the sometimes far-distant mareographs and their local references may introduce a large error margin ([Figure 9](#)).

The transition from the numerous MSL-based chart datums of each country to BSCD2000 is a complex and stretched process from the first decisions to the final implementation in the chart products. In particular, paper charts need longest to be switched due to the long production cycles. Some countries, like Estonia, have already informed mariners about the changes to BSCD2000 and have published the first products. Others, like Denmark, are about to formally

adopt BSCD2000 as the name of their chart datum without having to actually change their charted depths. Therefore, this section only gives an overview about the general situation in the respective countries. [Table 2](#) summarizes the national geodetic reference frames, positioning services and HRS realizations that can be used with BSCD2000. Regularly updated details about the implementation status as well as instructions for users, e.g. leaflets, are provided via the CDWG website (<http://www.bahc-pro.org/groups/cdwg>).

In **Sweden** and **Finland**, a calculated MSL has been used as reference level (chart datum) for nautical charts and water level information. The reference level for regularly updated epochs (estimated present-day MSL) was estimated from long time series of annual mean values of mareograph observations. Depths from printed charts needed to be converted semi-automatically by means of a correction formula in order to correct for the time difference and to make the charted depth compatible with the provided water level information. As motivated in [Section 2](#), this two-step approach implied a lot of work to keep the nautical products updated and consistent. At the same time, it was not straightforward and error-prone for the mariner.

Thus, decisions to make a transition to BSCD2000 in Sweden and Finland have come a long way. In Sweden, both water level information and 50% of all nautical charts are now using BSCD2000. In Finland, part of the bathymetric and chart data have already been transformed to BSCD2000. Water level information is ready to be provided in BSCD2000 when first charts will be published in the new datum. [Figure 7](#) details the estimated height of the current calculated MSL relative to BSCD2000 for selected mareographs in Sweden and Finland.



**Figure 7:** Differences between the reference levels of the old national chart datums with respect to Baltic Sea Chart Datum (BSCD2000). In green, the reference level is the calculated MSL in the year 2000 (according to different national conventions). The values from Norway shows the MSL over the period 1998–2014, relative BSCD2000<sup>(NAP)</sup>. In Estonia, Latvia and Lithuania, the Krasnodar reference level is used as old chart datum. In Poland, the local Polish Height System Amsterdam NH<sub>0</sub> is used as chart datum. Notice how postglacial rebound reduces the magnitude of the calculated MSL relative BSCD2000 in the Bay of Bothnia; it is now just a few cm close to the location of maximum uplift. The values are taken from BOOS (2020).

# Notices to Mariners (NtM)

\* 14040

**Sweden, not area bound. New reference system for sea level, nautical charts and warnings.  
BSCD2000 / RH 2000.**

Expired notices: 2019:754/13917

See: 2018:716/13140

As of June 3, 2019, the Swedish national height system 'Rikets Höjdsystem 2000', or RH 2000 (international name 'Baltic Sea Chart Datum 2000', BSCD2000) will constitute the reference level for observations and forecasts of the water level in Swedish waters.

The zero level in RH 2000 is fixedly linked to land, and is not affected by land uplift, changes in sea level or geographical variations.

The change means that observations, forecasts, and warnings in the Swedish Maritime Administration's and Swedish Meteorological and Hydrological Institute's (SMHI) viewing services from 3 June 2019, or soon thereafter, refer to the new reference level and no longer to the 'mean sea level'.

The Swedish Maritime Administration is gradually adapting the charts to the new reference system. This is a time consuming process which will take several years to complete. During the transition period, it is important to know which reference level is used in the different charts. If the text 'Baltic Sea Chart Datum 2000', or 'BSCD2000' is printed in the chart, the update has been performed.

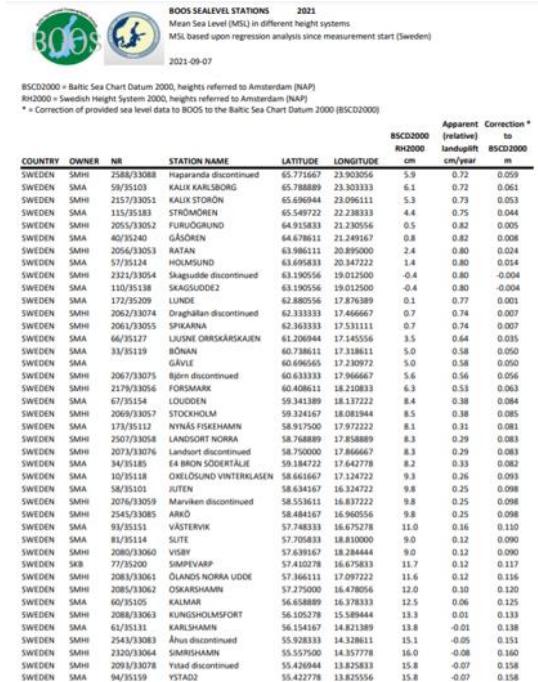
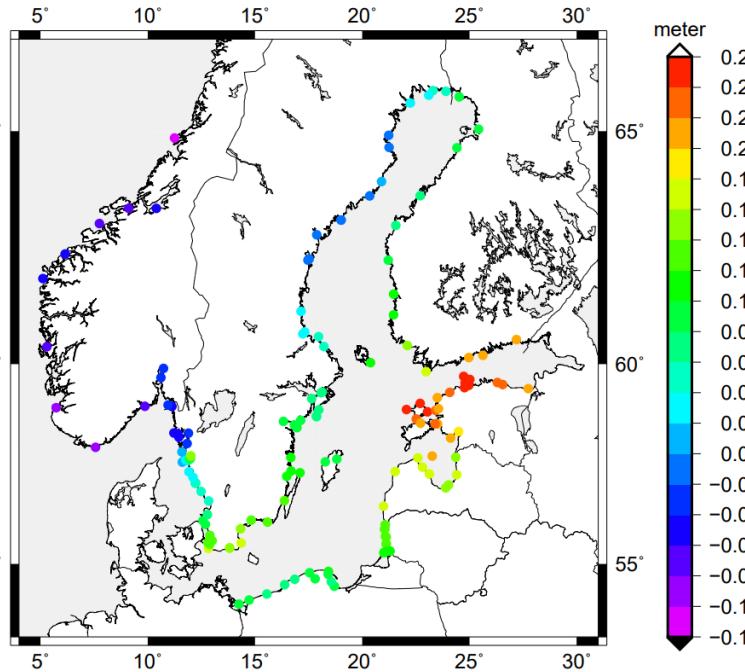
More information: [www.sjofartsverket.se/RH2000](http://www.sjofartsverket.se/RH2000) and [www.smhi.se](http://www.smhi.se)

[www.sjofartsverket.se/RH2000](http://www.sjofartsverket.se/RH2000) [www.smhi.se](http://www.smhi.se)

*SMHI och Sjöfartsverket. Publ. 15 May 2019*



# Reference levels in the Baltic Sea



Reference levels used in the Baltic Sea, Marine Copernicus and EMODNET Data Portals and differences with respect to the Baltic Sea Chart Datum 2000 (BSCD2000). In Sweden and Finland, the old reference levels are equal to Mean Sea Level (MSL) transferred to year 2023 (according to different national conventions). The values from Norway shows the MSL over the period 1996-2014, relative BSCD2000. In Estonia, Latvia and Lithuania, the Kronstadt reference level is used as old chart datum. In Poland, the local Polish Height System Amsterdam NN<sub>55</sub> is used as chart datum. Notice how postglacial rebound reduces the magnitude of the MSL in the Bay of Bothnia. The values are shown in this [Table](#).



## 2. CDWCWG List of Members

### Members of CDWCWG:

|           |                                |
|-----------|--------------------------------|
| Denmark   | Mr Nikolaj Møller              |
| Denmark   | Mr Kristian Villadsen Kristmar |
| Estonia   | Mrs Gabriela Kotsulim          |
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| Lithuania | Mr Mindaugas Zakarauskas       |
| Poland    | Mr Witold Stasiak              |
| Poland    | Mrs Alicja Olszewska           |
| Russia    | Mr Leonid Shalnov              |
| Russia    | Dr Sergey V. Reshetniak        |
| Sweden    | Mr Thomas Hammarklint (Chair)  |
| Sweden    | Mr Lars Jakobsson              |
| Sweden    | Mr Henrik Tengbert             |

### Observers and Experts:

|           |                                    |
|-----------|------------------------------------|
| Estonia   | Prof. Artu Ellmann                 |
| Estonia   | Dr Sander Varbla                   |
| Estonia   | Dr Nicole Camille Delpeche-Ellmann |
| Finland   | Mr Jarmo Mäkinen                   |
| Finland   | Mrs Anni Jokiniemi                 |
| Finland   | Dr Jani Särkkä                     |
| Finland   | Dr Mirjam Bilker-Koivula           |
| Finland   | Dr Timo Saari                      |
| Germany   | Dr Gunter Liebsch                  |
| Germany   | Dr Joachim Schwabe                 |
| Latvia    | Mr Armands Murans                  |
| Latvia    | Mr Krists Dzenis                   |
| Lithuania | Mr Emelis Tertelis                 |
| Lithuania | Mr Romuald Obuchovski              |
| Norway    | Mr Aksel Voldsund                  |
| Poland    | Mr Krzysztof Pyrchla               |
| Poland    | Mrs Małgorzata Pająk               |
| Poland    | Dr Monika Wilde-Piórko             |
| Poland    | Dr Małgorzata Szelachowska         |
| Sweden    | Dr Jonas Ågren                     |
| Sweden    | Dr Per-Anders Olsson               |
| Sweden    | Mrs Johanna Linders                |

### CDWCWG List of Members



# 3. CDWCWG TORs

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BSHC Chart Datum, Water level and Currents Working Group



**BSHC Chart Datum, Water level and Currents Working Group (CDWCWG)**  
Terms of Reference  
20 September 2023

Approved by the BSHC 28<sup>th</sup> Conference, 19-21 September 2023

The Working Group should

Report to the BSHC Conferences.

1. To continue implementation of the Baltic Sea Chart Datum 2000 (EVRS with land-uplift epoch 2000).
2. To prepare the road map for transition, including e.g.:
  - to establish a network of relevant bodies involved into the transition and efficiently communicate and give guidance within this network
  - to invite relevant bodies to inform the users
  - to review of progress of national plans and actions
  - to propose harmonization actions.
3. To cooperate with relevant bodies on water level related issues e.g.:
  - to promote studies on the validation, status and distribution of water level information, and to promote studies on interpolation and prediction of water levels
  - to promote studies on displaying schemes for joint Baltic Sea water level information
  - to promote studies on recommendations to IHO bodies how the sea level and its variations should be shown on nautical paper and ENC charts and publications, and conveying water level information to mariners [ref. IHO Technical Resolutions].
4. To support development of a common harmonized height reference, including further development of a common geoid model for the whole Baltic Sea area:
  - to promote geoid computations and gravity measurements in the Baltic sea, as is needed to realize the Baltic Sea Chart Datum 2000
  - to coordinate the finalization of the BSCD2000 height reference grid

# 4. CDWCWG Work Programme



BSHC Chart Datum, Water level and Currents Working Group

**BSHC Chart Datum, Water level and Currents Working Group (CDWCWG)**  
**Work Programme**  
**20 September 2023**

**Approved by the BSHC 28<sup>th</sup> Conference, 19-21 September 2023**

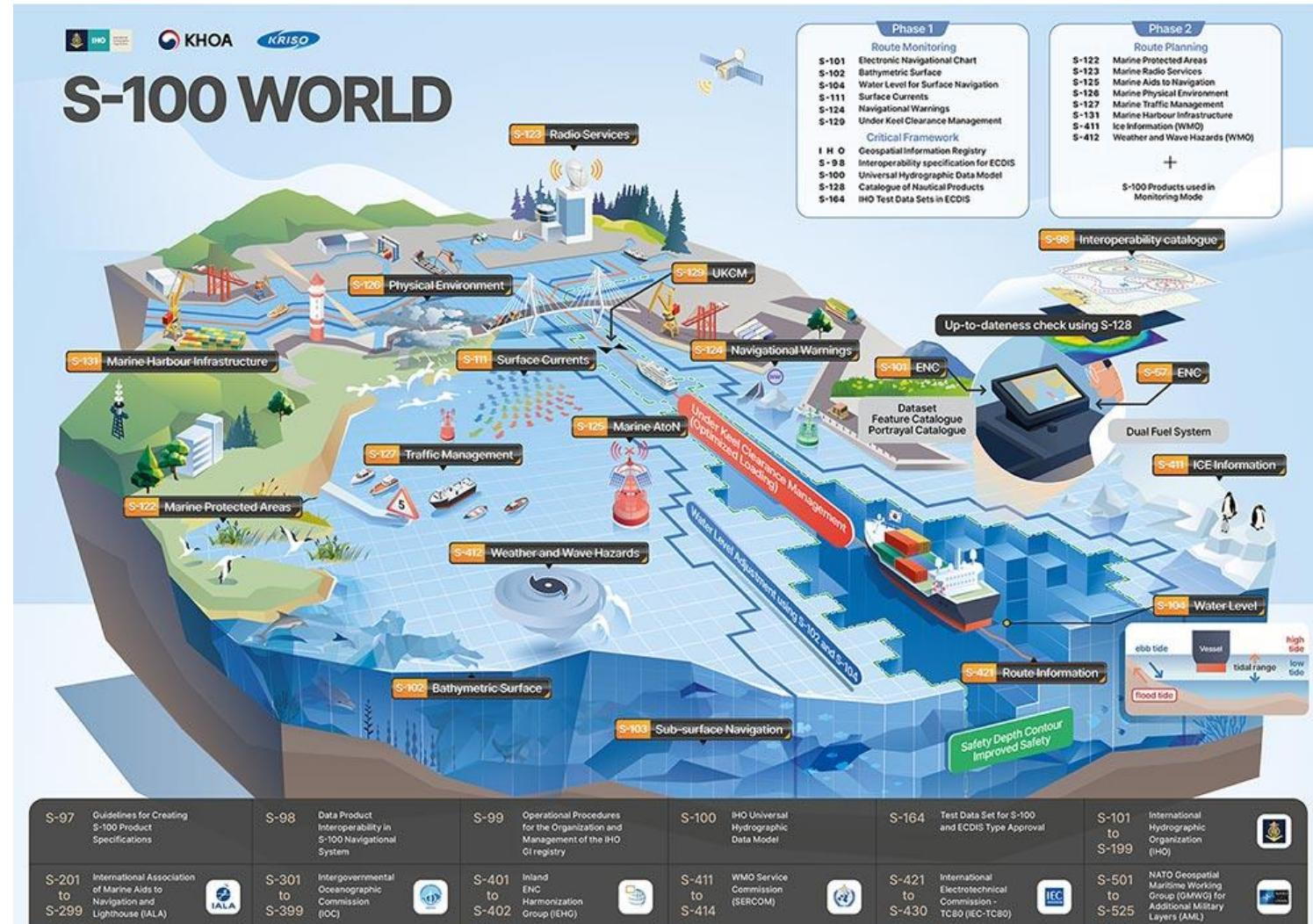
**Note:** This Work Programme includes those Tasks which were identified as the priority issues and which are expected to be fostered from 2023 and onwards bearing in mind the resources the BSHC members have.

**Tasks:**

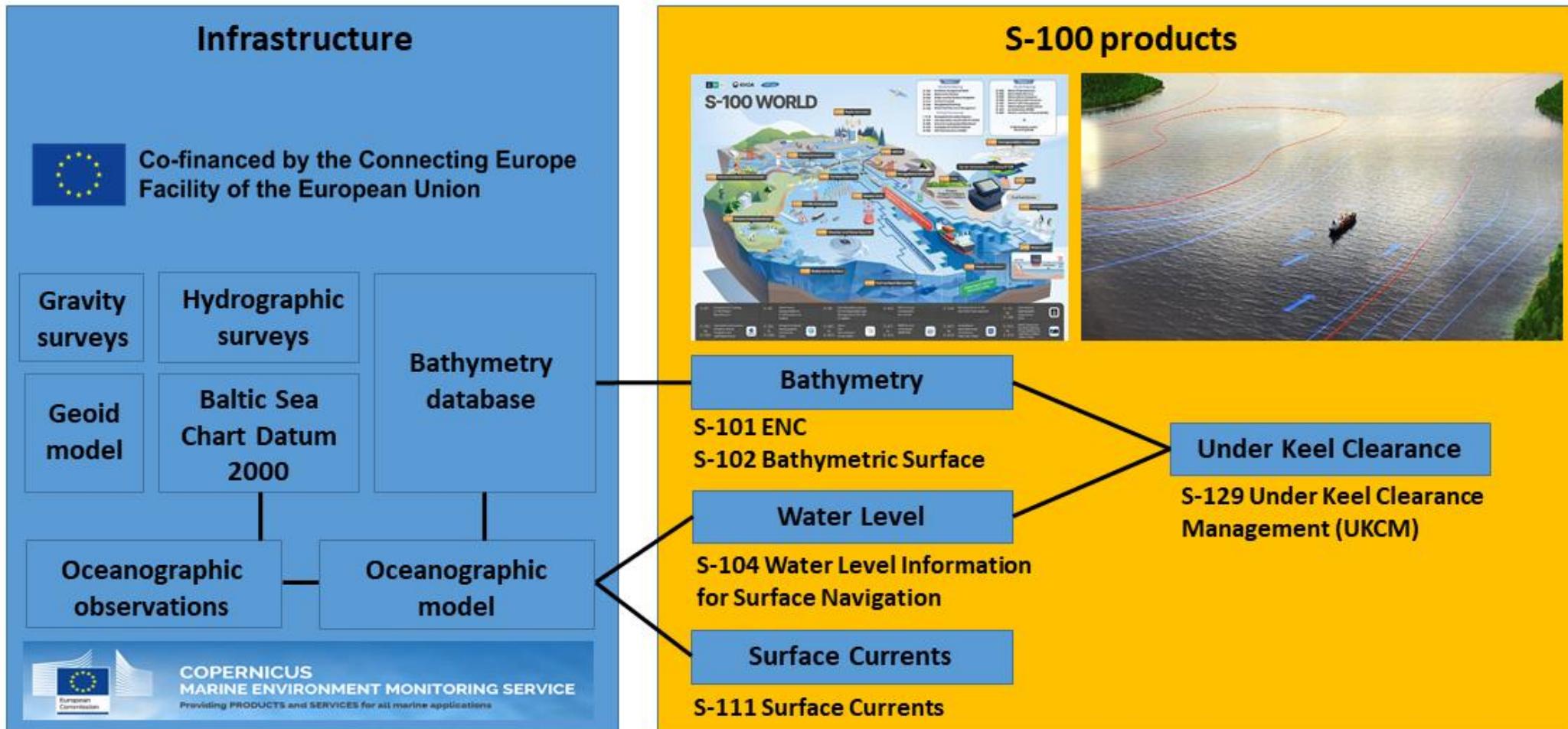
1. Guide the implementation process of vertical reference within the Baltic Sea region.
  - a. To monitor and follow up the status of the relevant actions identified.
  - b. To ensure efficient communication with relevant bodies.
  - c. To propagate and explain the idea of harmonized chart datum.
  - d. To foster national efforts for realization and coordinate the implementation of S-104 and S-111 in the Baltic Sea.
2. Review of progress of national plans and actions.
3. Propose harmonization actions.
4. Promote studies and further development of a common geoid model and dynamic topography for the whole Baltic Sea, mainly by supporting and collaborating with relevant projects, e.g. organizing ship time for gravity measurements. Invite member states to consider gravity measurements and geoid computation and provide an overview where additional gravity measurements are needed.
5. Promote improvement of precise real-time GNSS navigation for the future.
6. Cooperate with BOOS and invite other relevant institutes and organizations for the implementation of S-104 and S-111 in the Baltic Sea.
7. Support other IHO working groups and European projects in issues concerning water level, currents and reference systems.



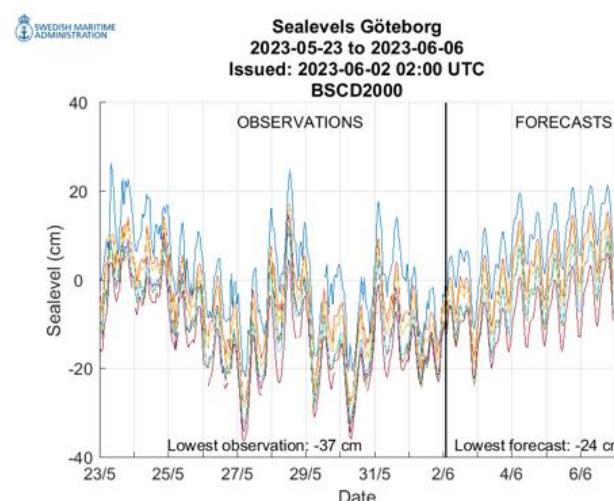
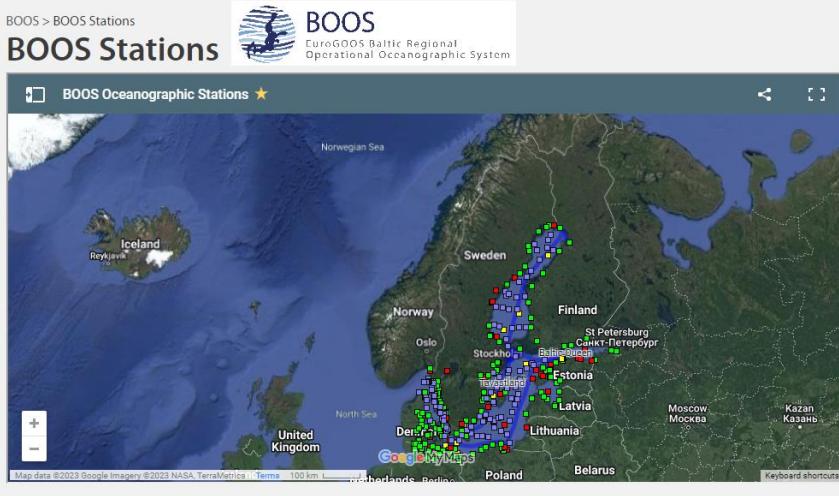
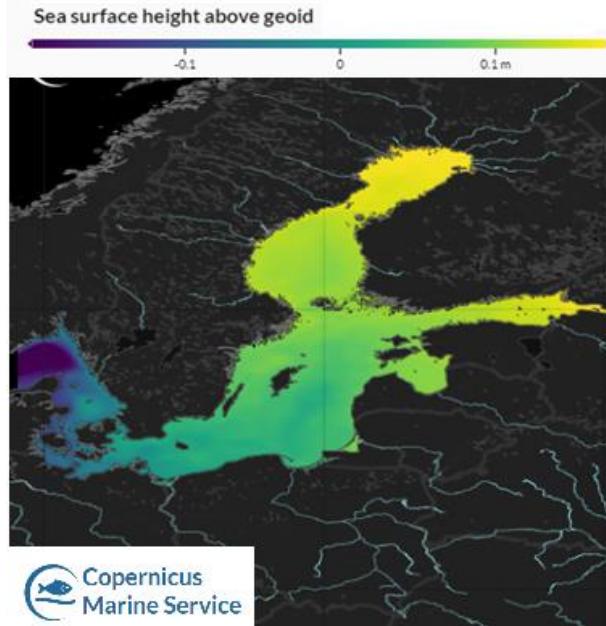
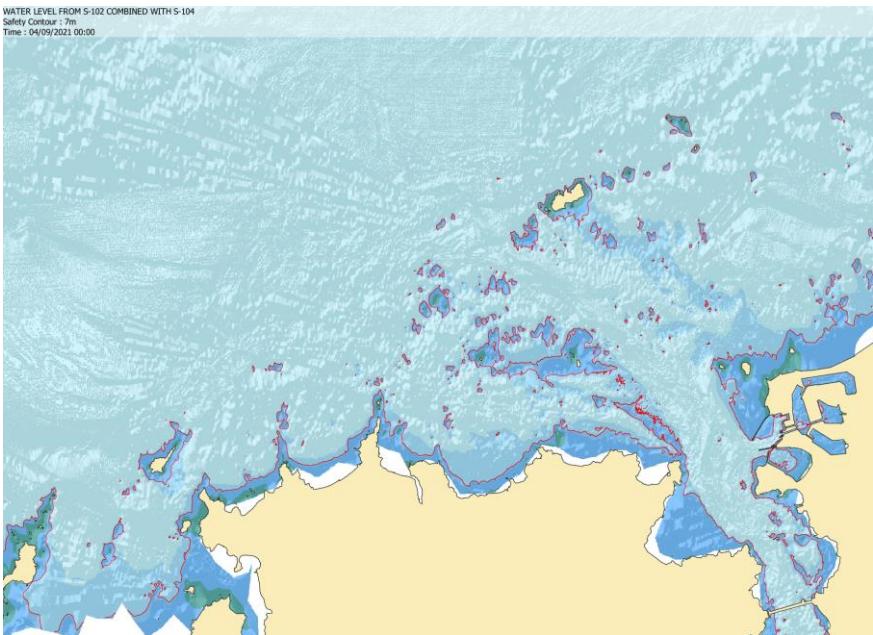
# 5. Future Maritime Services S-100



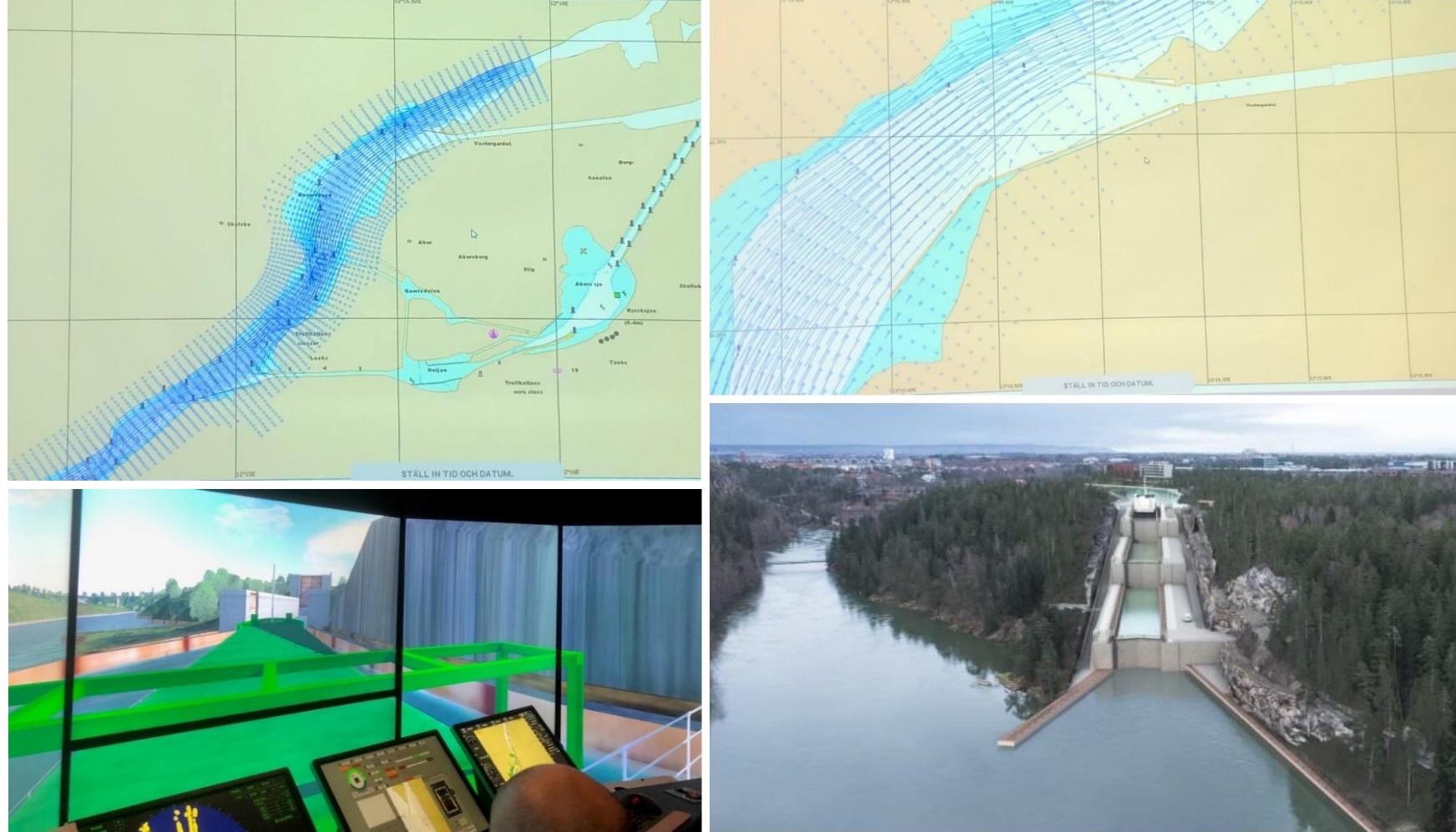
# Real Time Hydrographic and Environmental Information Service



# S-104 Water Level



# S-111 Surface Currents



# Future navigation



## 6. How member states benefit best of CDWCWG

- Sending representatives to meetings
- Answering to questionnaires – helps coordination of implementation
- Fostering national transition to the Baltic Sea Chart Datum 2000 (BSCD2000) and **implementation of S-104 and S-111**
- Invite representatives with oceanographic skills to the working group
- Supporting complementary gravity surveys and common geoid model computation in the Baltic Sea – i.e. participating in the Continuity Management of BSCD2000



## 7. Actions requested from BSHC 29<sup>th</sup> Conference

The BSHC 29<sup>th</sup> Conference is invited to:

1. Note this report
2. Give further guidance to CDWCWG, as seen appropriate



Thanks!



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