



**BALTIC SEA  
HYDROGRAPHIC  
COMMISSION**



**IHO**

# **BSHC30\_C3\_CDWCWG\_Presentation-SE**

30<sup>th</sup> BSHC Meeting  
22-24 September 2025  
Riga, Latvia

Thomas Hammarklint



# Objectives

1. Status of CDWCWG work: Meeting 2025 / Implementation status 2025
2. CDWCWG Member List
3. CDWCWG Terms of Reference
4. CDWCWG Work Programme
5. CDWCWG Regional product harmonisation guidelines for S-104 and S-111
6. Future Maritime Services S-100 with examples of S-104 and S-111
7. How member states benefits best of CDWCWG
8. Actions requested from the BSHC30 Conference



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

## [BSHC30 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 were approved at the BSHC Conference in September 2023 ([BSHC28](#)): Chart Datum, Water level and Currents Working Group ([CDWCWG](#)). A working group meeting ([CDWCWG2 Chair's Report](#), [Minutes](#)) was held on March 25-26, 2025 in Tallinn, Estonia, with [23 delegates](#) attended the meeting. The main objectives of the CDWCWG 2<sup>nd</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. A CDWCWG Harmonisation subgroup has been formed and a first version of a harmonisation document has been produced: [Regional product harmonisation guidelines for S-104 and S-111](#), a document for which the group is now seeking further guidance on from the BSHC30.

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

The first release of the BSCD2000 Height Transformation Grid (Geoid Model) was done in November 2023. A [release note](#) has been published in International Hydrographic Review (IHR) in November 2023.

The CDWCWG work have been or will be presented at the following meetings and conferences in 2024-2026:

- NSHC TWG26, 6-7 February 2024, Göteborg, Sweden [[Presentation](#), [Minutes](#)]
- BSHC CDWCWG1, 26-27 March 2024, Helsinki, Finland [[Presentation](#), [Minutes](#)]
- BOOS, 6-8 May 2024, Copenhagen, Denmark [[Presentation](#)]
- TWCWG9, 19-22 November 2024, Monaco [[Presentation](#)]
- BSHC CDWCWG2, 25-26 March 2025, Tallinn, Estonia [[Presentation](#), [Minutes](#)]
- BOOS, 5-7 May 2025, Sopot, Poland [[Presentation](#), [Minutes](#)]
- BSHC30, 22-24 September 2025, Riga, Latvia [[Report](#), [Presentation](#)]
- NSHC TWG28, 4-5 February 2026, VTC [Presentation, Minutes]
- BSHC CDWCWG3, 24-25 March 2026, TBC [Presentation, Minutes]
- BSHC31, 22-23 September 2026, TBC [Report, Presentation]
- TWCWG8, 20-22 February 2024, VTC
- Kartdagarna, 16-18 April 2024, Göteborg, Sweden [[Presentation](#)]
- BSHC29, 17-19 September 2024, Tallinn, Estonia [[Report](#), [Presentation](#)]
- NSHC TWG27, 4-5 February 2025, Taunton, UK [[Presentation](#), [Minutes](#)]
- Kartdagarna, 8-10 April 2025, Skellefteå, Sweden
- CDWCWG Harmonisation group 1<sup>st</sup> meeting, 11 June 2025, VTC [[Invitation](#)]
- TWCWG10, 4-7 November 2025, VTC [Presentation]
- Kartdagarna, 10-12 March 2026, Uppsala, Sweden
- BOOS, 4-6 May 2026, TBC [Presentation]
- TWCWG11, 4-7 November 2026, TBC [Presentation]

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 2nd meeting, 25-26 March 2025, Tallinn, Estonia

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

### Members of CDWCWG:

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 Xaver Lange
Germany	Mr Thorben Knoop
Germany	Dr Gunter Liebsch
Germany	Dr Joachim Schwabe
Latvia	Mr Armands Murans
Latvia	Mr Kristis Dzenis
Lithuania	Mr Emilis Tertelis
Lithuania	Mr Romuald Obuchovski
Norway	Mr Aksel Voldsund
Poland	Mr Krzysztof Pyrchla
Poland	Dr Monika Wilde-Piórko
Poland	Dr Malgorzata Szelachowska
Sweden	Dr Jonas Ågren
Sweden	Dr Per-Anders Olsson
Sweden	Mrs Johanna Linders



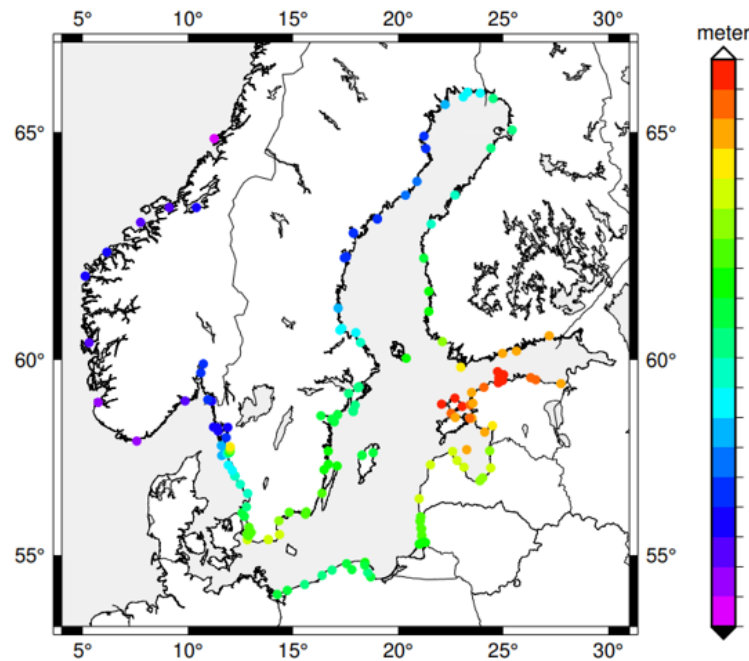
# Implementation status Baltic Sea 2025

## Summary implementation of BSCD2000, S-104 and S-111 status 2025:

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 (approx. 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 FCOO (Forsvarets Center for Operativ Oceanografi) is responsible for water level and current information. Have a plan for S-104 and S-111.  DGA and DMI coordinates the work.
<a href="#">Estonia</a>	All decisions are taken and the implementation is ongoing. All Berthing and Harbour cells and larger paper scales are in the new height system BSCD2000. 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="#">Nautimer</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 BHS77 (old system)</a> . The difference between BHS77 and EH2000 reaches up to 26 cm in the Gulf of Finland.  Responsibility of Talltech 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.  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 and 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> .  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.  Traficom and FMI coordinates 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+DHHN2016). 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 DHHN2016 (BSCD2000). <a href="#">Data distributed to BOOS/CMEMS in relation to DHHN2016, but metadata refers to SNN76/Kronstadt (old system)</a> .  Responsibility of Federal Waterways and Shipping Administration (WSV).	BSH is responsible for water level and current information.  BSH coordinates the work.
<a href="#">Latvia</a>	All Paper Charts of Latvia are already implemented to BSCD, LAS-2000,5 since 24.01.2024. All approach and other scale band ENC's are implemented to BSCD2000, LAS-2000,5. Further planned actions are to continue production in BSCD2000, LAS-2000,5 and to implement it into S-100 standard.	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> .  Responsibility of Latvian Environment, Geology and Meteorology Centre (LVGMC).	Meeting between MAL and LVGMC officials has been held about S-104 and S-111.  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> .  Responsibility of Lithuanian Hydrometeorological Service (LHMS).	Data owner has been identified. LHMS is responsible for water level information and Klaipėda University (KU) for currents.  LTSA coordinates the work.
<a href="#">Poland</a>	The implementation of BSCD2000 in PL waters are completed. All charts have been updated to the BSCD2000 (PL-EVRF2007-NH). The last chart (chart No. 500 – general band) was updated in December 2024. All bathymetric data have earlier been transferred to the vertical reference system PL-EVRF2007-NH.	<a href="#">All water level stations is connected to PL-EVRF2007-NH (BSCD2000). Data distributed to BOOS/CMEMS in relation to Amsterdam NN55, but metadata refers to BHS77</a> . The difference between the NN55 and PL-EVRF2007-NH is less than 9 cm.  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.  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 is 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> .  Responsibility of Swedish Maritime Administration (SMA) and Swedish Meteorological and Hydrological Institute (SMHI).	Discussions started between SMA and SMHI. SMA and SMHI take part in the BS e-Nav-project in cooperation with FMI on this. We will take further actions in 2025.  SMA coordinates the work.

# Reference levels in the Baltic Sea

Reference levels Baltic Sea  
Water level information



BOOS SEALEVEL STATIONS 2021  
Mean Sea Level (MSL) in different height systems  
MSL based upon regression analysis since measurement start (Sweden)  
2021-09-07

BSCD2000 = Baltic Sea Chart Datum 2000, heights referred to Amsterdam (NAP)  
RH2000 = Swedish Height System 2000, heights referred to Amsterdam (NAP)  
\* = Correction of provided sea level data to BOOS to the Baltic Sea Chart Datum 2000 (BSCD2000)

COUNTRY	OWNER	NR	STATION NAME	LATITUDE	LONGITUDE	BSCD2000 RH2000	cm	Apparent (relative) landuplift cm/year	Correction * to BSCD2000 m
SWEDEN	SMHI	2188/33088	Hälsjöfjärden discontinued	65.771667	23.903056	5.9	0.72	0.059	
SWEDEN	SMA	58/35101	KALIX KARLSBORG	65.788889	23.303333	6.1	0.72	0.061	
SWEDEN	SMHI	2157/33051	KALIX STORÖN	65.690444	23.096111	5.3	0.73	0.053	
SWEDEN	SMA	115/35183	STRÖMÖREN	65.549722	22.238333	4.4	0.75	0.044	
SWEDEN	SMHI	2055/33052	FURUGRUND	64.915833	21.230556	0.5	0.82	0.005	
SWEDEN	SMA	40/35240	GÄDDEN	64.678611	21.249167	0.8	0.82	0.008	
SWEDEN	SMHI	2056/33053	RATAN	63.986111	20.895000	2.4	0.80	0.024	
SWEDEN	SMA	57/35124	HOLMSUND	63.695833	20.347222	1.4	0.80	0.014	
SWEDEN	SMHI	2321/33054	Skagviken discontinued	63.190556	19.012500	-0.4	0.80	-0.004	
SWEDEN	SMA	110/35138	SKAGVICKEN	63.190556	19.012500	-0.4	0.80	-0.004	
SWEDEN	SMA	172/35209	LUNDE	62.880556	17.876389	0.1	0.77	0.001	
SWEDEN	SMHI	2062/33074	Dragsåsen discontinued	62.333333	17.466667	0.7	0.74	0.007	
SWEDEN	SMHI	2061/33055	SPILARNA	62.363333	17.531111	0.7	0.74	0.007	
SWEDEN	SMA	66/35127	LÅNÖ ÖRSKÄRGAJEN	61.200444	17.145556	3.5	0.64	0.035	
SWEDEN	SMA	31/35119	BÖLÖN	60.738611	17.318611	5.0	0.58	0.050	
SWEDEN	SMA		GÄVLE	60.696556	17.230972	5.0	0.58	0.050	
SWEDEN	SMHI	2067/33075	Björn discontinued	60.633333	17.066667	5.6	0.56	0.056	
SWEDEN	SMHI	2179/33016	FORSMARK	60.408611	18.210833	6.3	0.53	0.063	
SWEDEN	SMA	67/35154	LOUDEN	59.341389	18.172222	8.4	0.38	0.084	
SWEDEN	SMHI	2065/33057	STOCKHOLM	59.324167	18.083944	8.5	0.38	0.085	
SWEDEN	SMA	173/35112	NYNÄS FISKERHAMN	58.917500	17.972222	8.1	0.31	0.081	
SWEDEN	SMHI	2507/33058	LANDSÖRT NORRA	58.768889	17.858889	8.3	0.29	0.083	
SWEDEN	SMHI	2073/33076	Landsort discontinued	58.750000	17.866667	8.3	0.29	0.083	
SWEDEN	SMA	34/35185	Å4 BRUN SÖDERÅLJE	58.184722	17.640778	8.2	0.33	0.082	
SWEDEN	SMA	10/35118	CHIELÖN VINTERLÅSEN	58.661667	17.124722	9.3	0.26	0.093	
SWEDEN	SMA	58/35101	JUTEN	58.634167	16.324722	9.8	0.25	0.098	
SWEDEN	SMHI	2076/33059	Marviken discontinued	58.553611	16.837222	9.8	0.25	0.098	
SWEDEN	SMHI	2543/33085	ÅRÖ	58.484167	16.960556	9.8	0.25	0.098	
SWEDEN	SMA	91/35151	VÄSTERBYK	57.748333	18.679378	11.0	0.16	0.110	
SWEDEN	SMA	81/35114	SLITE	57.705833	18.810000	9.0	0.12	0.090	
SWEDEN	SMHI	2080/33060	VISBY	57.639167	18.284444	9.0	0.12	0.090	
SWEDEN	SKB	77/35200	SMÄLVEVARP	57.410278	16.675833	11.7	0.12	0.117	
SWEDEN	SMHI	2081/33061	ÖLANDS NORRA UDÖ	57.366111	17.097222	11.6	0.12	0.116	
SWEDEN	SMHI	2085/33062	ÖSARSHAMN	57.275000	16.478056	12.0	0.10	0.120	
SWEDEN	SMA	60/35105	KALMAR	56.658889	16.378333	12.5	0.06	0.125	
SWEDEN	SMHI	2088/33063	KUNGSÖLMSFÖRT	56.105278	15.589444	13.3	0.01	0.133	
SWEDEN	SMA	61/35131	KARLSHAMN	56.154167	14.821389	13.8	-0.01	0.138	
SWEDEN	SMHI	2543/33083	Åhus discontinued	55.928333	14.328611	15.1	-0.05	0.151	
SWEDEN	SMHI	2120/33064	SMÖRSHAMN	55.557500	14.357778	16.0	-0.08	0.160	
SWEDEN	SMHI	2093/33078	Västad discontinued	55.426044	13.825833	15.8	-0.07	0.158	
SWEDEN	SMA	94/35159	VSTAD2	55.422778	13.825556	15.8	-0.07	0.158	

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>)

or

Mean Sea Level (Baltic Sea Chart Datum 2000)

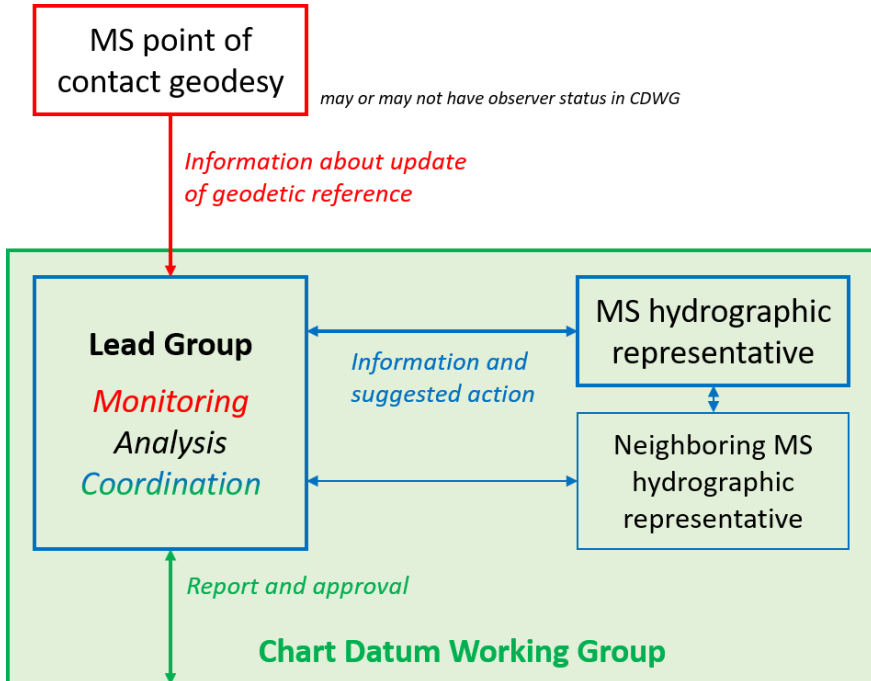
CHART DATUM: Mean Sea Level (Baltic Sea Chart Datum 2000<sup>RH2000</sup>)  
REFERENSNIVÅ: Medelvattenyta (Baltic Sea Chart Datum 2000<sup>RH2000</sup>)  
SYMBOLS and ABBREVIATIONS: see INT 1  
BETECKNINGAR och FÖRKORTNINGAR: se KORT 1





# 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/iho-bscd2000>

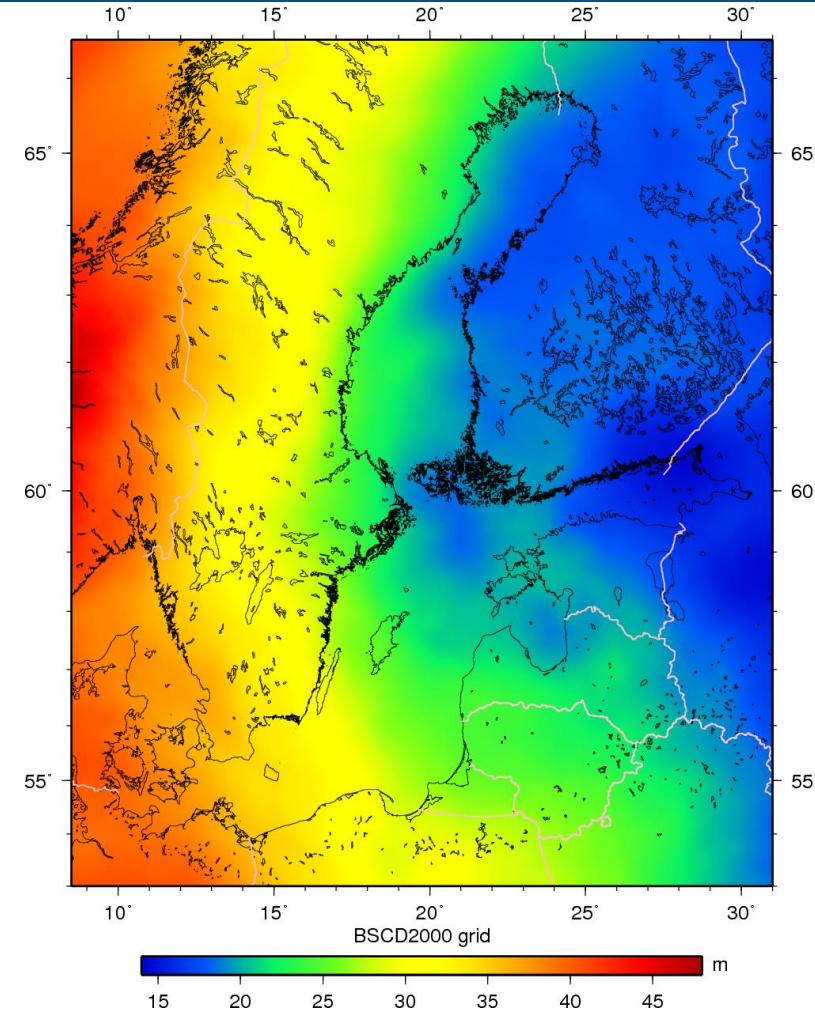
## Digital Object Identifier (DOI) with download

DOI: 10.58440/iho-bscd2000

URL: <https://doi.org/10.58440/iho-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.





# 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*



## 2. CDWCWG List of Members

### Members of CDWCWG:

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

### [CDWCWG List of Members](#)

### 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 Xaver Lange
Germany	Mr Thorben Knoop
Germany	Dr Gunter Liebsch
Germany	Dr Joachim Schwabe
Latvia	Mr Armands Murans
Latvia	Mr Kristis Dzenis
Lithuania	Mr Emilis Tertelis
Lithuania	Mr Romuald Obuchovski
Norway	Mr Aksel Voldsund
Poland	Mr Krzysztof Pyrchla
Poland	Dr Monika Wilde-Piórko
Poland	Dr Malgorzata Szelachowska
Sweden	Dr Jonas Ågren
Sweden	Dr Per-Anders Olsson
Sweden	Mrs Johanna Linders



# 3. CDWCWG TORs (with amendments)



26 March 2025

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

### Terms of Reference

To be approved by the BSHC 30<sup>th</sup> Conference, 22-24 September 2025  
Amendments marked in red, as proposed by CDWCWG2

#### 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), **S-104 Water Level Information and S-111 Surface Currents in the Baltic Sea.**
2. To prepare the road map for transition **and implementation**, 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 organizations, like meteorological and oceanographic institutes, to the working group to strengthen the implementation**
  - to invite relevant bodies to inform the users
  - to review of progress of national plans and actions
  - to propose harmonisation 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. CDWCWG Work Programme (no amendments)



20 September 2023

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

### Work Programme

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. CDWCWG Regional product harmonisation guidelines for S-104 and S-111



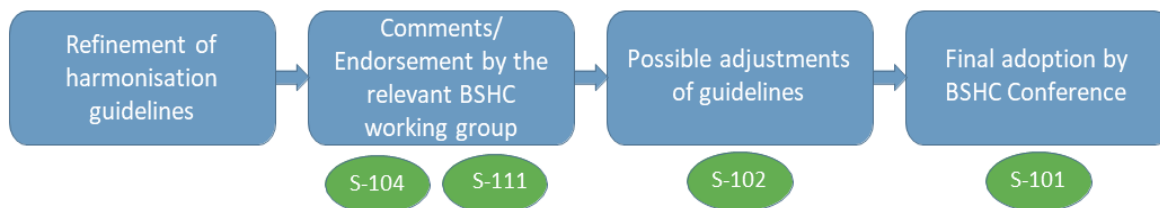
## Regional product harmonisation guidelines for S-104 and S-111

### Harmonisation activities



- Activity lead of harmonisation activities: Traficom
  - A2.3 Refinement of regional product harmonisation guidelines
  - A3.2 Formally adopt regional product harmonisation guidelines and establish delivery capabilities
- Standard-specific task forces (S-101, S-102, S-104 & S-111)

Workflow and status of harmonisation activities:



### Summary of the harmonisation recommendations for S-104 and S-111

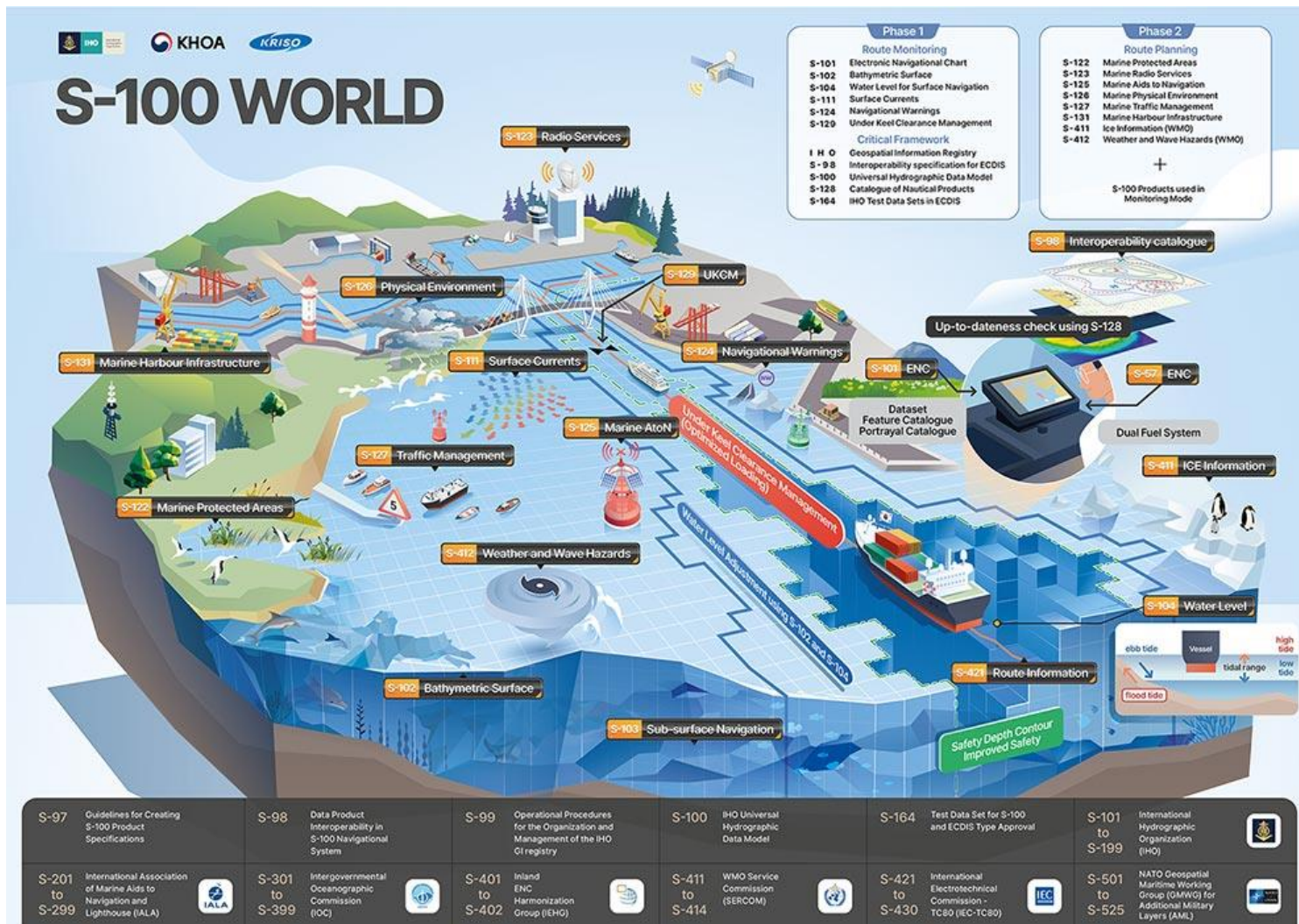
1. Recommendation: Baltic Sea Chart Datum 2000 (BSCD2000) should be used as reference system for water level information in S-104.
2. Recommendation: For S-111, the current values should be presented at a given depth relative the sea surface.
3. Recommendation: It is recommended to provide a S-104 water level and S-111 surface currents products based on sufficient resolution and reliable quality required to resolve the oceanographic conditions in the area.
4. Recommendation: The data producers or Hydrographic Offices are responsible for the production and delivery of S-104 water level and S-111 surface currents within their area of responsibility for the production of ENC.
5. Recommendation: Neighbouring countries should agree on harmonisation of data coverage and reduce differences of S-104 water level and S-111 surface currents products meeting at borders of areas of responsibility. It is recommended to keep data overlaps on borders to a minimum. The data overlap on borders should not exceed one grid cell.
6. Recommendation: It is recommended that every time a model run is finalized (typical every six hours, covering at least five days of data), the S-104 water level and S-111 surface currents products will be updated and delivered to the RENC to be made available for the end-users. If a model run is very delayed or incorrect, a cancellation of the products should be considered.
7. Recommendation: It is recommended to continuously monitor and validate the quality of the S-104 water level and S-111 surface currents products to ensure usability and trust.
8. Recommendation: Set uncertainty values in the metadata of the S 104 water level and S 111 surface currents products, to provide mariners with valuable information, enabling them to determine which data is more reliable or up to date for safe navigation.
9. Recommendation: The data producer or the Hydrographic Office should perform a technical validation according to S-158 of the produced S-104 and S-111 data files (HDF5-format), put a signature, i.e. create and attach a signature file (xml-format) for each data file and deliver the wrapped data set to the RENC.
10. Recommendation: The Hydrographic Offices and data producers aim to have continuous S-104 water level and S-111 surface current products, especially in areas where S-102 bathymetric surface are available. Therefore, the Hydrographic Offices and data producers are recommended on defining parameters (e.g. coverage and resolution adjustments or by interpolating) to assure continuous surface, ensuring usability for mariners.



## 6. Future Maritime Services S-100

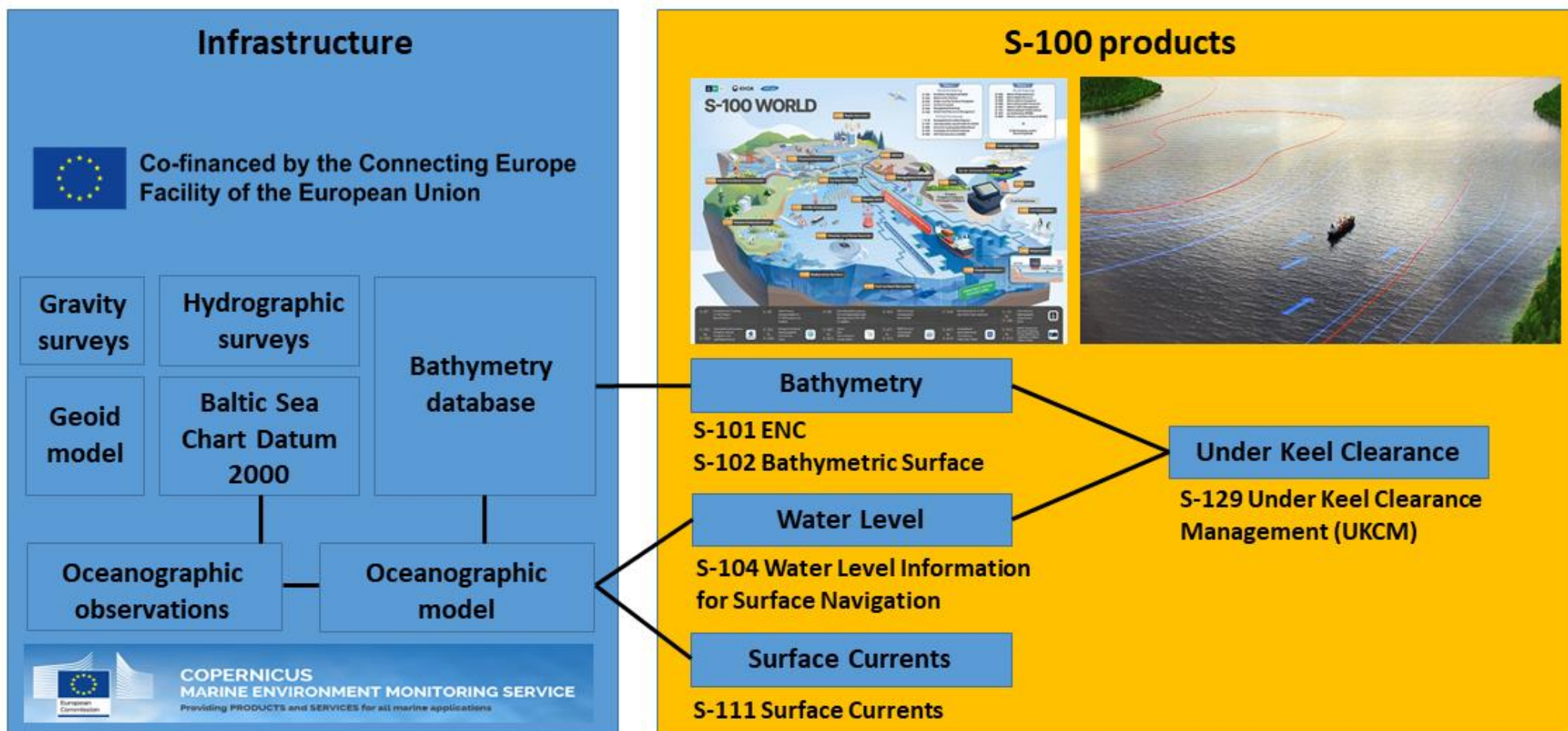


IHO





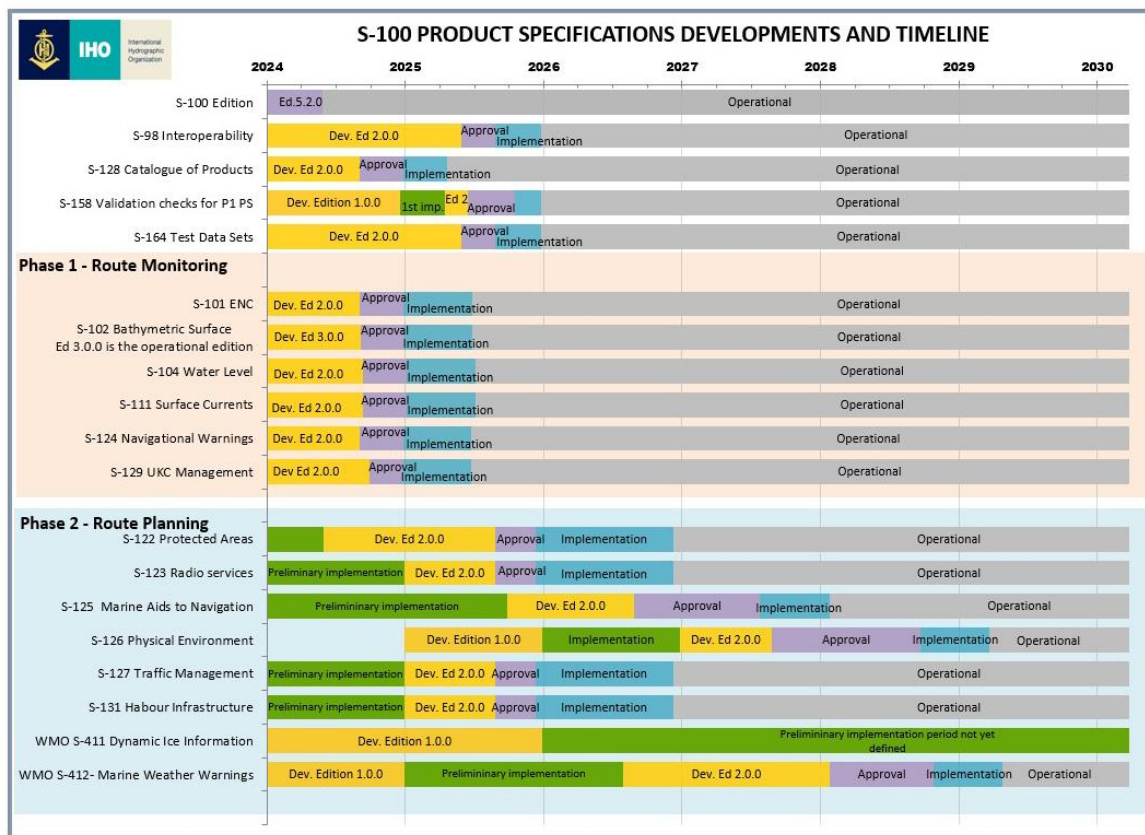
# Real Time Hydrographic and Environmental Information Service



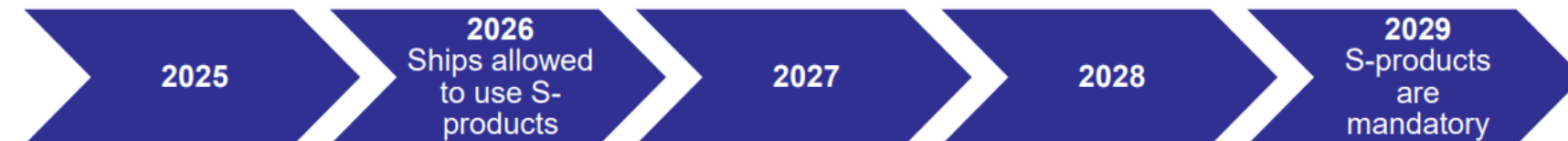
# S-100 Implementation

## IHO S-100 Implementation Strategy

Table A – IHO list of S-100 products with special focus	
First step – Route monitoring mode	
<b>S-101</b>	Electronic Navigational Chart (ENC)
<b>S-102</b>	Bathymetric Surface
<b>S-104</b>	Water Level Information for Surface Navigation
<b>S-111</b>	Surface Currents
<b>S-124</b>	Navigational Warnings
<b>S-129</b>	Under Keel Clearance Management
Critical Framework	
	IHO Geospatial Information Registry
<b>S-98</b>	Interoperability Specification
<b>S-100</b>	Universal Hydrographic Data Model
<b>S-128</b>	Catalogue of Nautical Products
<b>S-164</b>	Test Data Set for S-100 and ECDIS Type Approval
Second step – Route planning mode	
<b>S-122</b>	Marine Protected Areas
<b>S-123</b>	Marine Radio Services
<b>S-125</b>	Marine Aids to Navigational (AtoN)
<b>S-126</b>	Marine Physical Environment
<b>S-127</b>	Marine Traffic Management
<b>S-131</b>	Marine Harbour Infrastructure



This S-100 timeline is updated: 02 07 2024



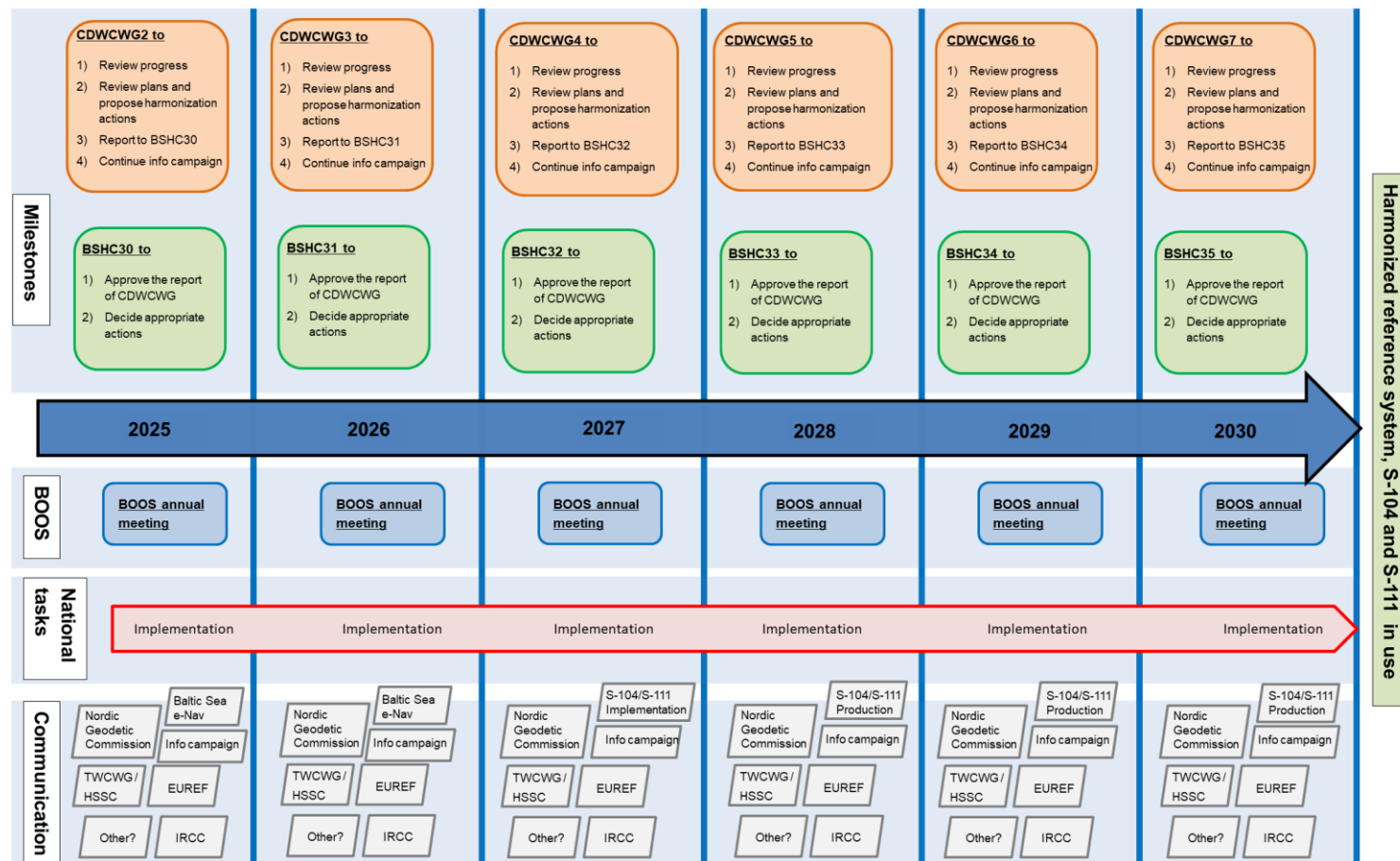


# CDWCWG Roadmap

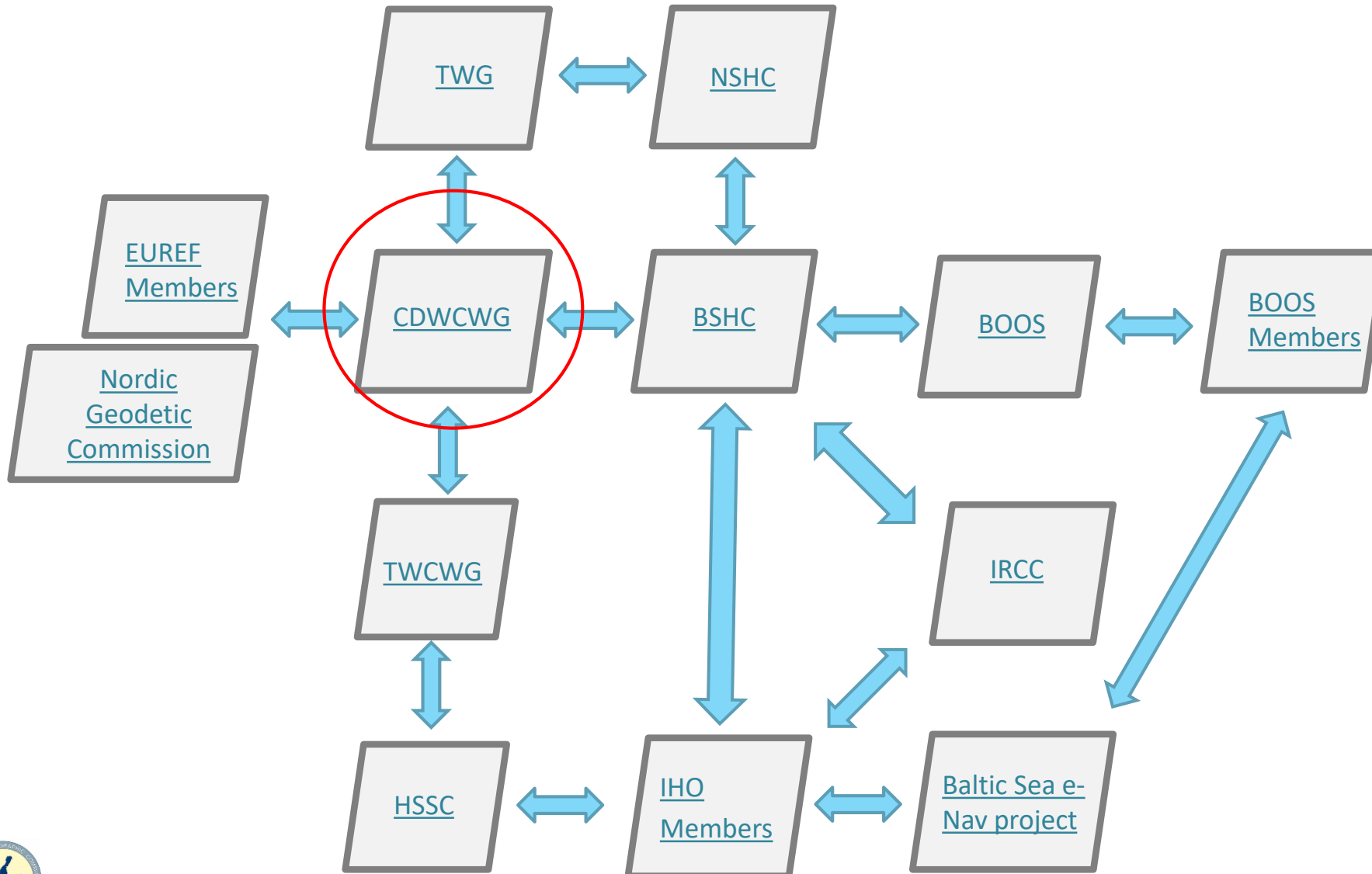
## RoadMap

BSHC CDWCWG / Harmonized Reference System / S-104 and S-111 Implementation / Time Line

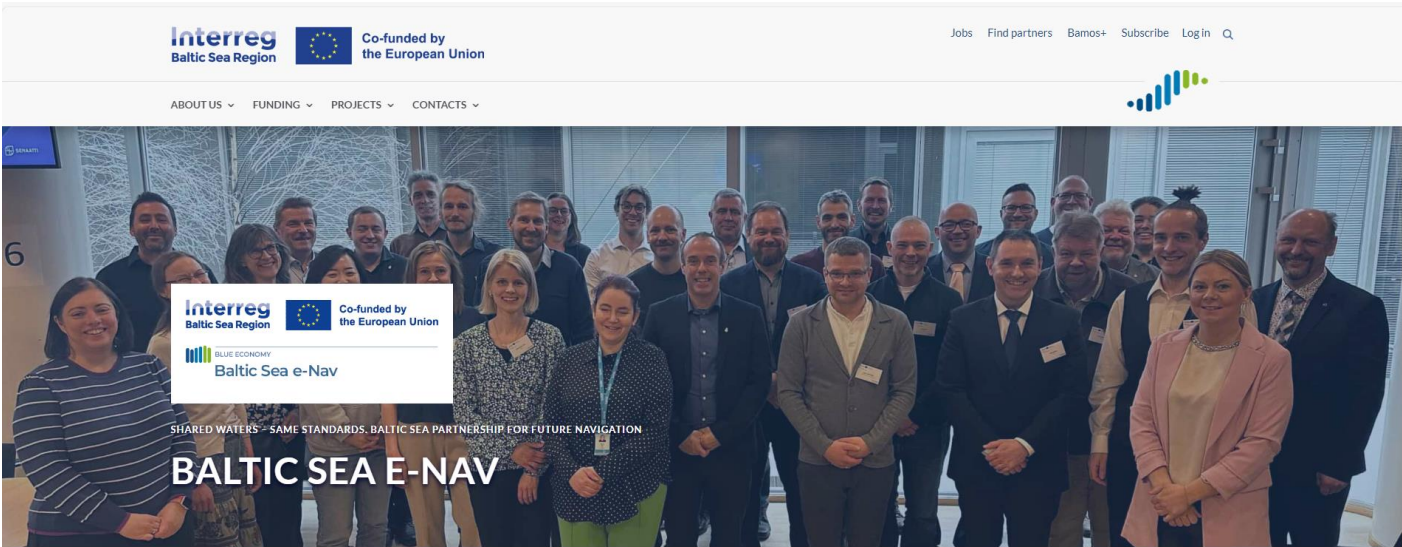
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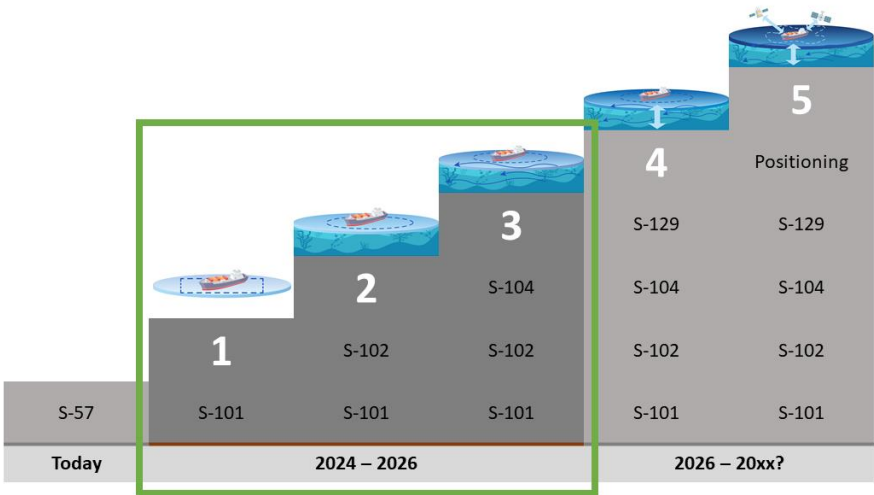
# CDWCWG International relations



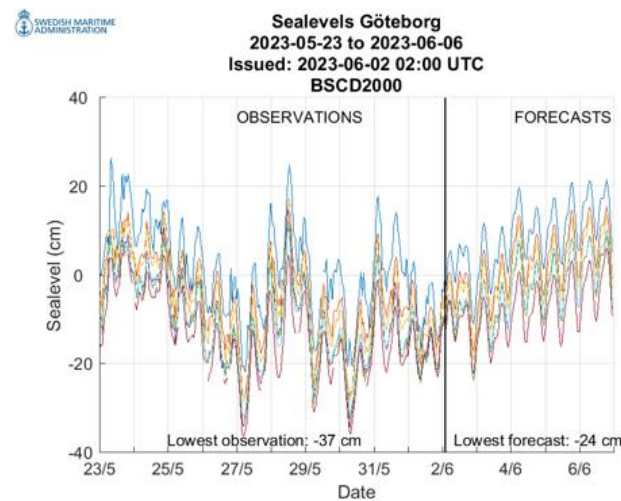
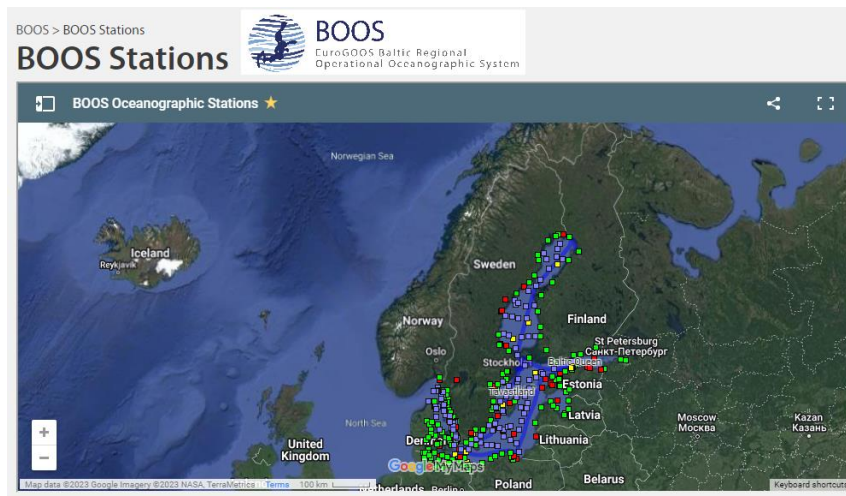
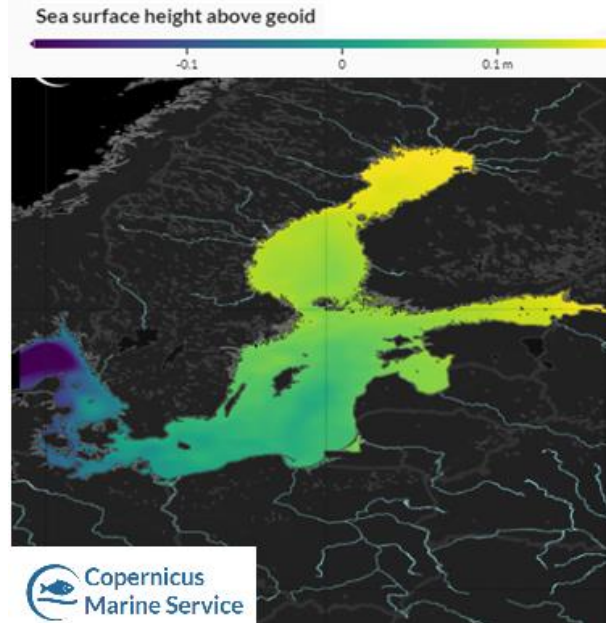
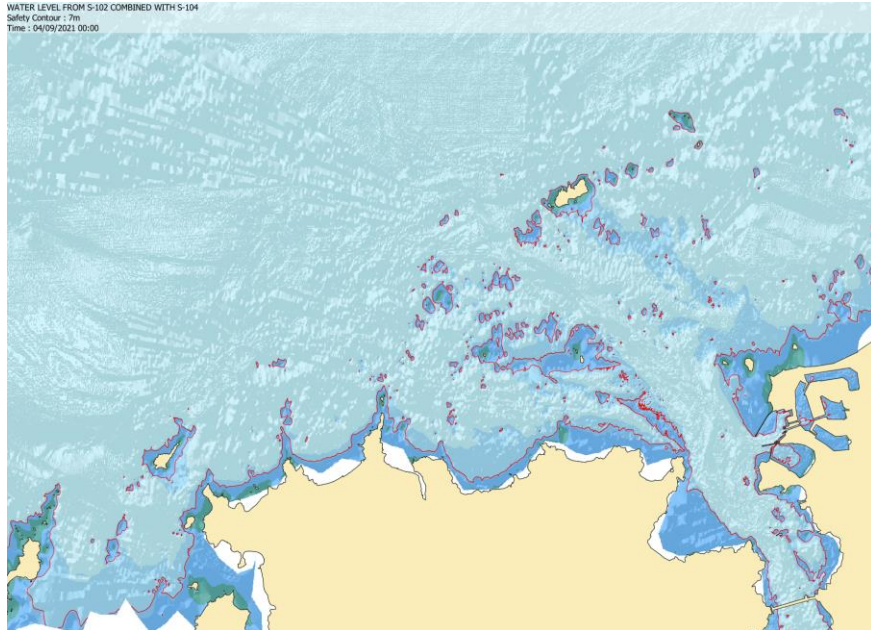
# Baltic Sea e-Nav Interreg project 2023-2026



Goal	Period
Develop <b>production capabilities</b> for S-101 ENC, S-102 bathymetry and to some extent S-104 water level	2023-2025
Establish <b>harmonization rules</b> for S-10x-products, under the BSHC umbrella	2024-2026
<b>Test, evaluate and refine</b> the S-10x products	2025
<b>Commercial rollout</b> for S-101 and S-102 in the Baltic Sea. S-104 in parts of FI.	2026

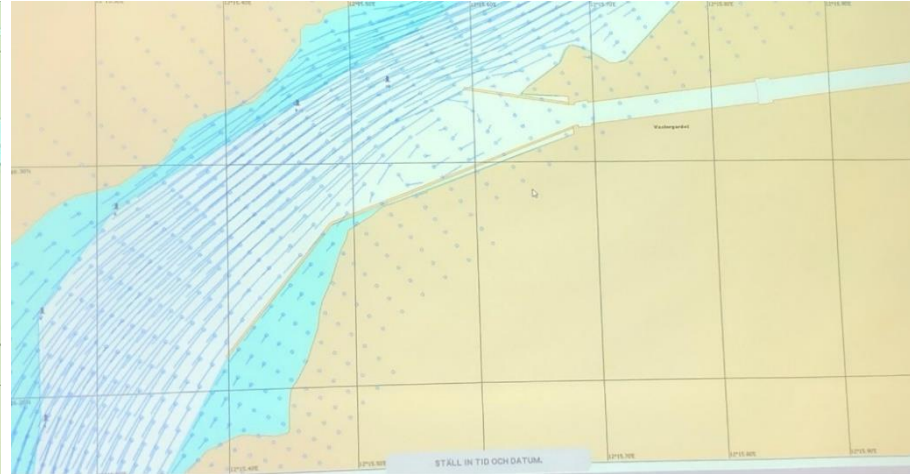
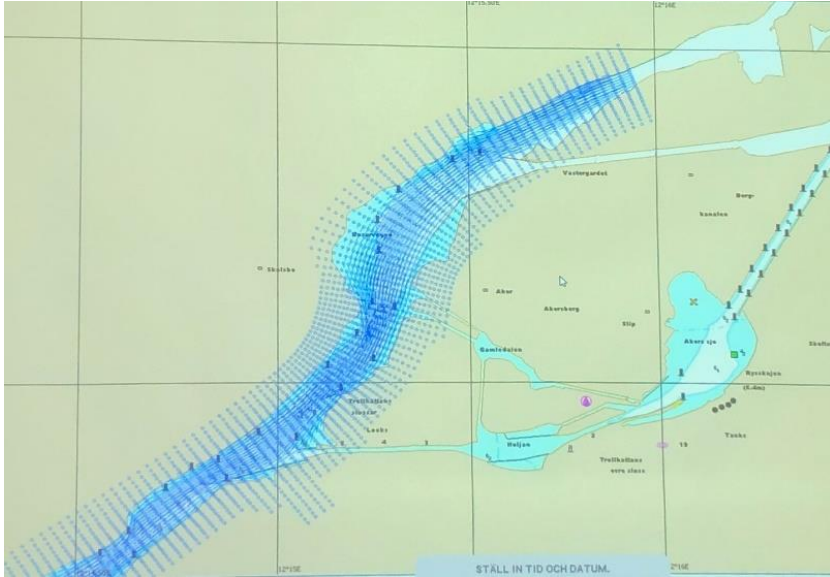


# S-104 Water Level





# S-111 Surface Currents





# Future navigation



## 7. How member states benefits best of CDWCWG

- Sending representatives to meetings
- Answering to questionnaires – helps coordination of implementation
- Fostering national implementation of the Baltic Sea Chart Datum 2000 (BSCD2000), S-104 and S-111
- Propose regional harmonisation actions
- 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



## 8. Actions requested from BSHC 30<sup>th</sup> Conference

The BSHC 30<sup>th</sup> Conference is invited to:

1. Note this report
2. Approve the amendments to the Terms of References
3. Approve the Work programme (no amendments)
3. Confirm and give further guidance to the [Regional product harmonisation guidelines for S-104 and S-111](#)
4. Give further guidance to CDWCWG, as seen appropriate



Thanks!



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