



**BALTIC SEA  
HYDROGRAPHIC  
COMMISSION**



**IHO**

# Chair's Report to CDWCWG2

**2<sup>nd</sup> CDWCWG Meeting**

25-26 March 2025

Tallinn, Estonia

Thomas Hammarklint



# Baltic Sea Hydrographic Commission (BSHC)



## BALTIC SEA HYDROGRAPHIC COMMISSION



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### BSHC-Members



### The Baltic Sea Hydrographic Commission,

which is an integrant part of the International Hydrographic Organisation (IHO), promotes the technical co-operation in the domain of hydrographic surveying, marine cartography and nautical information among the neighboring countries of the Baltic Sea region.

The main objectives of the Commission are the coordination of the production of the Baltic Sea INT Charts, the coordination of hydrographic re-surveys, harmonization of chart datums, harmonization of Baltic Sea ENCs, and the exchange of information and the harmonization of practices with regard to various issues related to hydrography.

The most recent development is the [Baltic Sea Bathymetric Database](#) – accessible via this portal.

#### International Hydrographic Organization

The International Hydrographic Organization is an intergovernmental consultative and technical organization that was established in 1921 to support safety of navigation and the protection of the marine environment. The object of the Organization is to bring about:

- The coordination of the activities of national hydrographic offices
- The greatest possible uniformity in nautical charts and documents
- The adoption of reliable and efficient methods of carrying out and exploiting hydrographic surveys
- The development of the sciences in the field of hydrography and the techniques employed in descriptive oceanography

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# 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

# 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-uptift 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 RH 2000	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 and for water level information:

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)

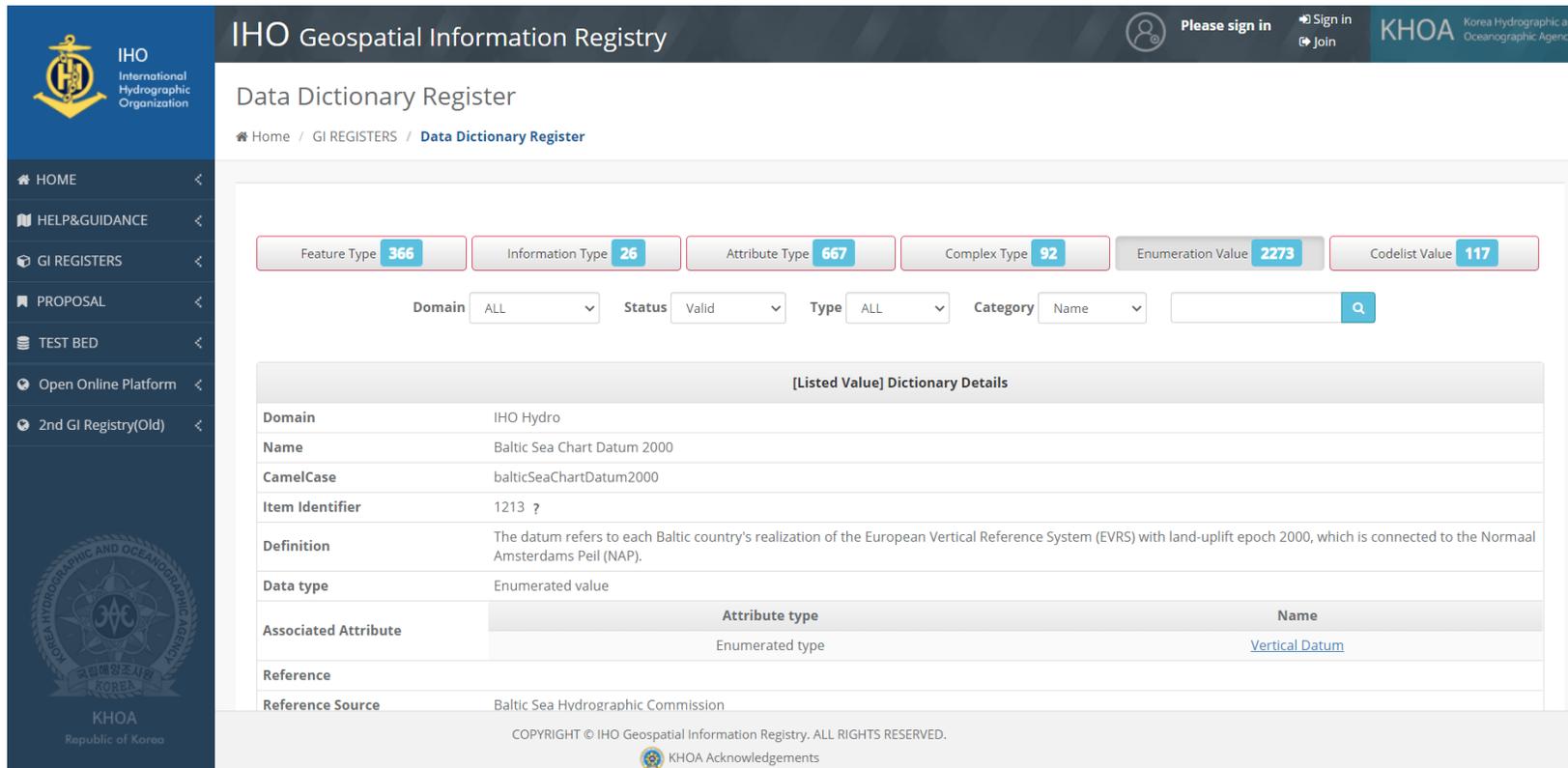
BSCD2000

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



# Baltic Sea Chart Datum 2000 in IHO GI Registry

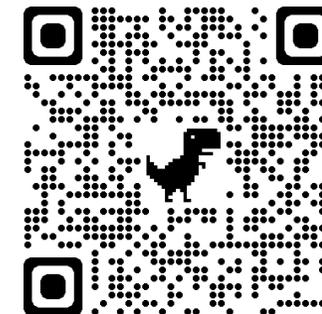
**BSCD2000 is now included in IHO Geospatial Information (GI) Registry, as chart datum number 44:**



The screenshot displays the IHO Geospatial Information Registry Data Dictionary Register. The page header includes the IHO logo and navigation links for 'Please sign in', 'Sign in', and 'Join'. The KHOA logo (Korea Hydrographic and Oceanographic Agency) is also present. The main content area shows a search filter with the following statistics: Feature Type (366), Information Type (26), Attribute Type (667), Complex Type (92), Enumeration Value (2273), and Codelist Value (117). The search filters are set to Domain: ALL, Status: Valid, Type: ALL, and Category: Name. Below the filters, the '[Listed Value] Dictionary Details' table provides the following information:

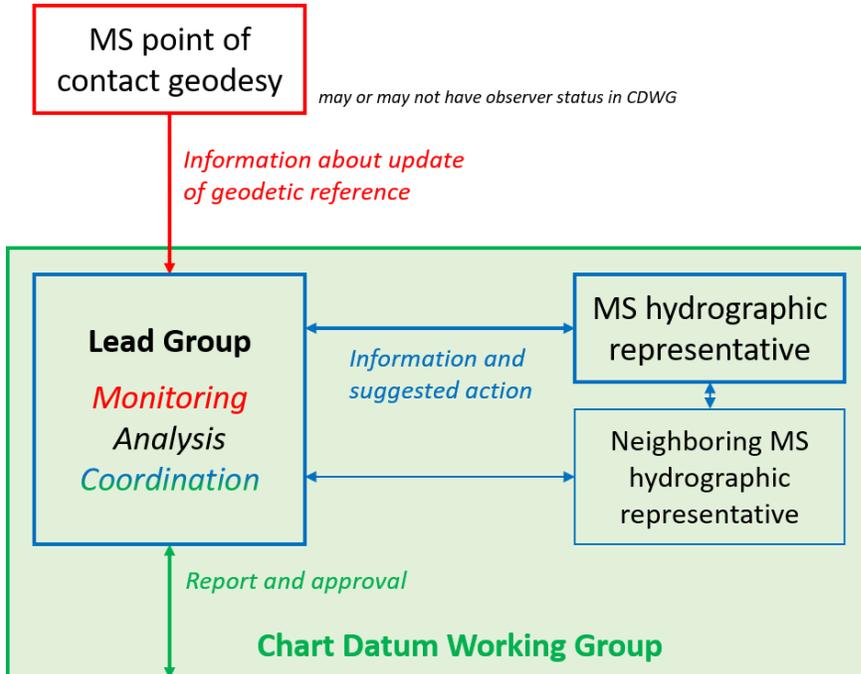
[Listed Value] Dictionary Details					
Domain	IHO Hydro				
Name	Baltic Sea Chart Datum 2000				
CamelCase	balticSeaChartDatum2000				
Item Identifier	1213 ?				
Definition	The datum refers to each Baltic country's realization of the European Vertical Reference System (EVRS) with land-uplift epoch 2000, which is connected to the Normaal Amsterdams Peil (NAP).				
Data type	Enumerated value				
Associated Attribute	<table border="1"><thead><tr><th>Attribute type</th><th>Name</th></tr></thead><tbody><tr><td>Enumerated type</td><td><a href="#">Vertical Datum</a></td></tr></tbody></table>	Attribute type	Name	Enumerated type	<a href="#">Vertical Datum</a>
Attribute type	Name				
Enumerated type	<a href="#">Vertical Datum</a>				
Reference					
Reference Source	Baltic Sea Hydrographic Commission				

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KHOA Acknowledgements



# 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>

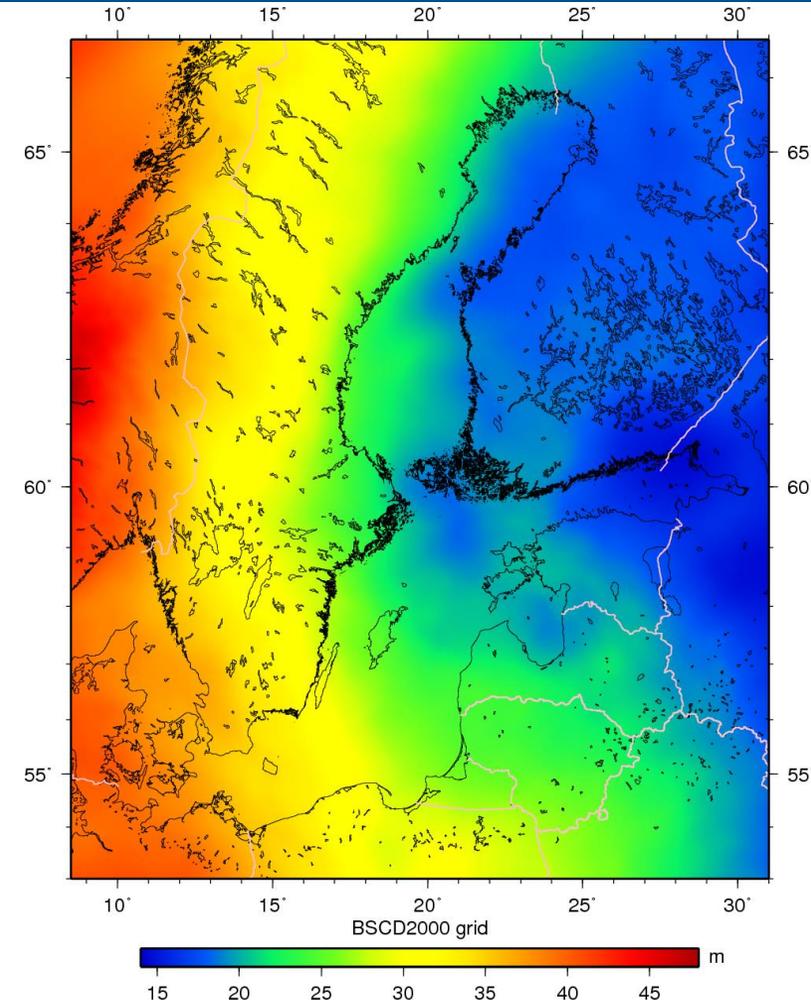
## Digital Object Identifier (DOI) with download

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.



# CDWCWG Terms of Reference

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 BSHC18 (September 2013) decided to continue CDWG work and wished the harmonized Baltic Sea vertical reference to be implemented.

### **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



# 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.



# CDWCWG1 List of Actions



BSHC Chart Datum, Water level and Currents Working Group

**List of Actions**  
**BSHC CDWCWG1**  
**26-27 March 2024**  
 Helsinki, Finland

Action #	Who	Action	Time schedule	Remarks/Status
1	All	Update the ToRs and Work programme. Report to BSHC29.	BSHC29 meeting 17-19 September 2024	Done 2024-09-18
2	All	Elect a permanent secretary for the working group	BSHC29 meeting 17-19 September 2024	Done 2024-03-27 No permanent secretary elected. We will have a rotating secretary.
3	Secretary	Draft <a href="#">Minutes</a> to Chair	2024-04-15	Done 2024-03-29
4	Chair	To check the draft <a href="#">Minutes</a> and send to participants for comments	2024-04-15	Done 2024-04-03
5	Participants	To comment the draft <a href="#">Minutes</a>	2024-04-26	Done 2024-04-26
6	Chair	To send the final <a href="#">Minutes</a> to all members	2024-04-30	Done 2024-05-04
7	Chair	To circulate CDWCWG report to BSHC29 to all members	2024-06-30	Done 2024-07-12
8	Chair	<a href="#">CDWCWG report to BSHC29</a>	<del>2024-08-09</del> 2024-08-16	Done 2024-08-13
9	Chair	<a href="#">CDWCWG presentation at BSHC29</a>	BSHC29 meeting 17-19 September 2024	Done 2024-09-18
10	Chair and Jonas	Update Figure 4b in the <a href="#">Specification of the Baltic Sea Chart Datum 2000</a>	2025-03-25	Ongoing
11	Chair	Chair to organize a <a href="#">CDWCWG2 meeting</a> , 25-26 March 2025, Tallinn, Estonia	2025-03-25	Ongoing Invitation sent out 2024-12-06
12	All	Nationally decide when to make to shift of water level data to BSCD2000 going to BOOS/CEMMS/EMODNET.	2025-03-25	Ongoing
13	Chair	Coordinate the shift of water level data to BSCD2000 after the national decisions has been done referred to action #12.	2025-03-25	Ongoing
14	Chair / Johanna	Check and correct the metadata of the water level in the BOOS data service.	2025-03-25	Ongoing



# Outcome from BSHC29/2024

## **Actions given from BSHC29 to CDWCWG:**

No actions were given.

## **Decisions taken related to CDWCWG:**

No decisions were taken.



# Meetings and major outcomes 2024

- NSHC TWG26, 6-7 February 2024, Göteborg, Sweden
- TWCWG8, 20-23 February 2024, VTC  
Development of S-104 Specification on Water level etc.
- BSHC CDWCWG1, 26-27 March 2024, Helsinki, Finland  
Review and update of Actions since the last meeting  
Received answers to the Questionnaire
- Kartdagarna, 16-18 April 2024, Göteborg, Sweden
- BOOS Annual meeting, 6-8 May 2024, Copenhagen, Denmark
- BSHC29, 17-19 September 2024, Tallinn, Estonia  
Present the CDWCWG work and new Actions to CDWCWG
- TWCWG9, 19-22 November 2024, Monaco  
Development of S-104 Specification on Water level etc.
- Baltic Sea e-Nav partner meeting, 3-4 December 2024, Tallinn, Estonia

[Website](#) / [Minutes](#) / [Photo](#)  
[CDWCWG Presentation](#)

[Website](#) / [Documents](#)

[Website](#)  
[Minutes](#) / [Photo](#)  
[Summary 2024](#)

[Website](#)  
[BSCD2000 Presentation](#)

[Website](#)  
[CDWCWG Presentation](#)

[Website](#) / [Documents](#) / [Photo](#)  
[CDWCWG Report](#) / [Presentation](#)

[Website](#) / [Documents](#) / [Photo](#)  
[CDWCWG Presentation](#)

[Website](#)



# Meetings and major outcomes 2025

- NSHC TWG27, 4-5 February 2025, Taunton, UK

[Website](#) / [Program](#) / [Photo](#)  
[CDWCWG Presentation](#)

- BSHC CDWCWG2, 25-26 March 2025, Tallinn, Estonia  
**Review and update of Actions since the last meeting**  
**Received answers to the Questionnaire**

[Website](#)  
[Program](#) / [Agenda](#) / [Photo](#)  
[Summary 2025](#)

- Kartdagarna, 8-10 April 2025, Skellefteå, Sweden

[Website](#)

- Baltic Sea e-Nav partner meeting, 9-11 April 2025, Rauma, Finland

[Website](#)

- BOOS Annual meeting, 2-4 June 2025, Sopot, Poland

[Website](#) / [Presentation](#)

- BSHC30, 22-24 September 2025, Riga, Latvia  
**Present the CDWCWG work and new Actions to CDWCWG**

[Website](#) / [Documents](#) / [Photo](#)  
[CDWCWG Report](#) / [Presentation](#)

- TWCWG10, 4-7 November 2025, TBC  
**Development of S-104 Specification on Water level etc.**

[Website](#) / [Documents](#) / [Photo](#)  
CDWCWG Presentation



# Meetings and major outcomes 2026

- NSHC TWG28, 3-4 February 2026, VTC
- BSHC CDWCWG3, 24-25 March 2026, Riga, Latvia  
Review and update of Actions since the last meeting  
Received answers to the Questionnaire
- Kartdagarna, 7-9 April 2026, TBC
- BOOS Annual meeting, 4-6 May 2026, TBC
- BSHC31, 21-23 September 2026, TBC  
Present the CDWCWG work and new Actions to CDWCWG
- TWCWG11, November 2026, TBC  
Development of S-104 Specification on Water level etc.

[Website](#) / [Program](#) / [Photo](#)  
[CDWCWG Presentation](#)

[Website](#)  
[Program](#) / [Agenda](#) / [Photo](#)  
[Summary 2026](#)

[Website](#)

[Website](#)  
[CDWCWG Presentation](#)

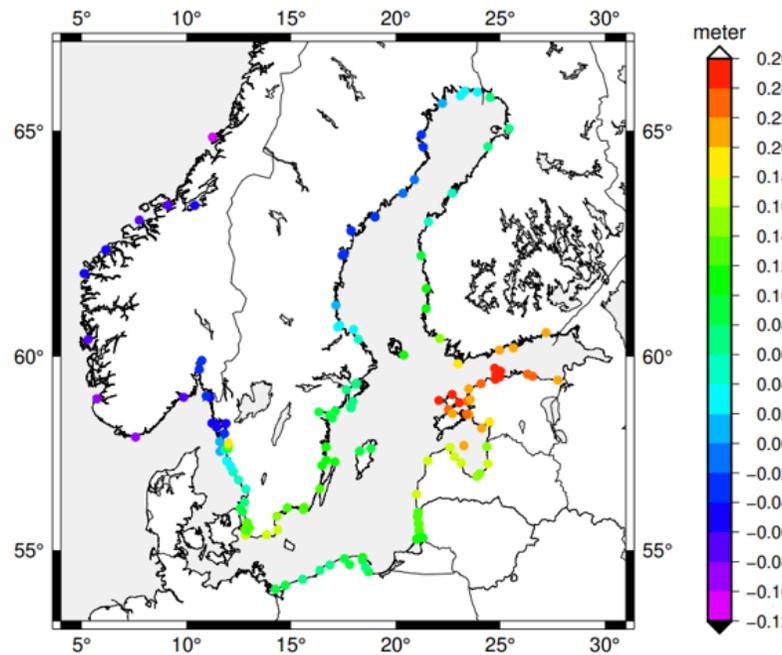
[Website](#) / [Documents](#) / [Photo](#)  
[CDWCWG Report / Presentation](#)

[Website](#) / [Documents](#) / [Photo](#)  
CDWCWG Presentation



# 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)

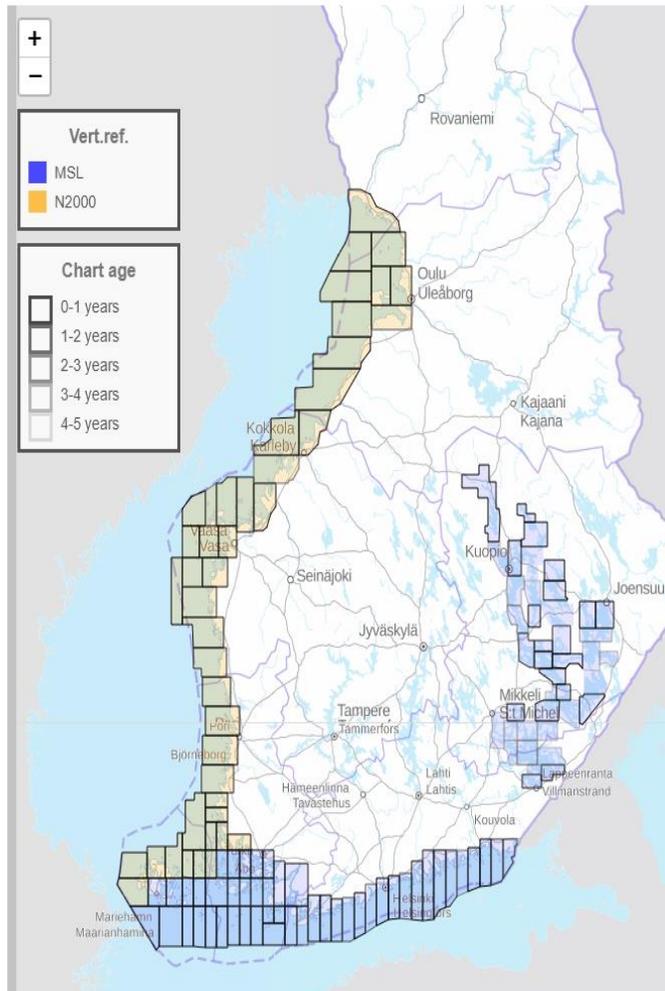
COUNTRY	OWNER	NR	STATION NAME	LATITUDE	LONGITUDE	BSCD2000 RH2000	cm	Apparent (relative) land uplift cm/year	Correction * to BSCD2000 m
SWEDEN	SMHI	2182/3308	Hägeranda discontinued	65.771667	23.303056		5.9	-0.72	0.059
SWEDEN	SMA	59/35103	KALIX KARLSBORG	65.788889	23.303333		6.1	0.72	0.061
SWEDEN	SMHI	2157/33051	KALIX STORÖN	65.696944	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	FURUÖGRUND	64.915833	21.230556		0.5	0.82	0.005
SWEDEN	SMA	40/35240	GÅSÖEN	64.878611	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	Skagvalde discontinued	63.190556	19.012500		-0.4	0.80	-0.004
SWEDEN	SMA	110/35138	SKAGSÖDEE	63.190556	19.012500		-0.4	0.80	-0.004
SWEDEN	SMA	172/35209	LUNDE	62.800556	17.876389		0.1	0.77	0.001
SWEDEN	SMHI	2062/33074	Dragsållen discontinued	62.333333	17.466667		0.7	0.74	0.007
SWEDEN	SMHI	2061/33055	SPIKARNA	62.363333	17.531111		0.7	0.74	0.007
SWEDEN	SMA	66/35127	LÅSÖNE ÖRRSKÄRKAJEN	61.200944	17.145556		3.5	0.64	0.035
SWEDEN	SMA	33/35119	SÖREN	60.738611	17.318611		5.0	0.58	0.050
SWEDEN	SMA		GÄVLJE	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	LOUDÖN	59.341389	18.137222		8.4	0.38	0.084
SWEDEN	SMHI	2065/33057	STOCKHOLM	59.234167	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	Å 180N SÖDERTÄLJE	58.184722	17.647778		8.2	0.33	0.082
SWEDEN	SMA	102/35118	CHIELÖLUND VIKTERIKLÅSEN	58.661667	17.124722		9.3	0.26	0.093
SWEDEN	SMA	58/35101	JUTTEN	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	2545/33085	ÅRÖ	58.484167	16.902556		9.8	0.25	0.098
SWEDEN	SMA	93/35151	VÄSTERVIK	57.748333	16.672778		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	SAMPEVARP	57.410278	16.675833		11.7	0.12	0.117
SWEDEN	SMHI	2081/33061	ÖLANDS NORRA UDDE	57.386111	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	14.329811		15.1	-0.05	0.151
SWEDEN	SMHI	2120/33064	SMARSHAMN	55.557500	14.357778		16.0	-0.08	0.160
SWEDEN	SMHI	2093/33078	Ystad discontinued	55.426944	13.825833		15.8	-0.07	0.158
SWEDEN	SMA	94/35159	YSTAD	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](#).

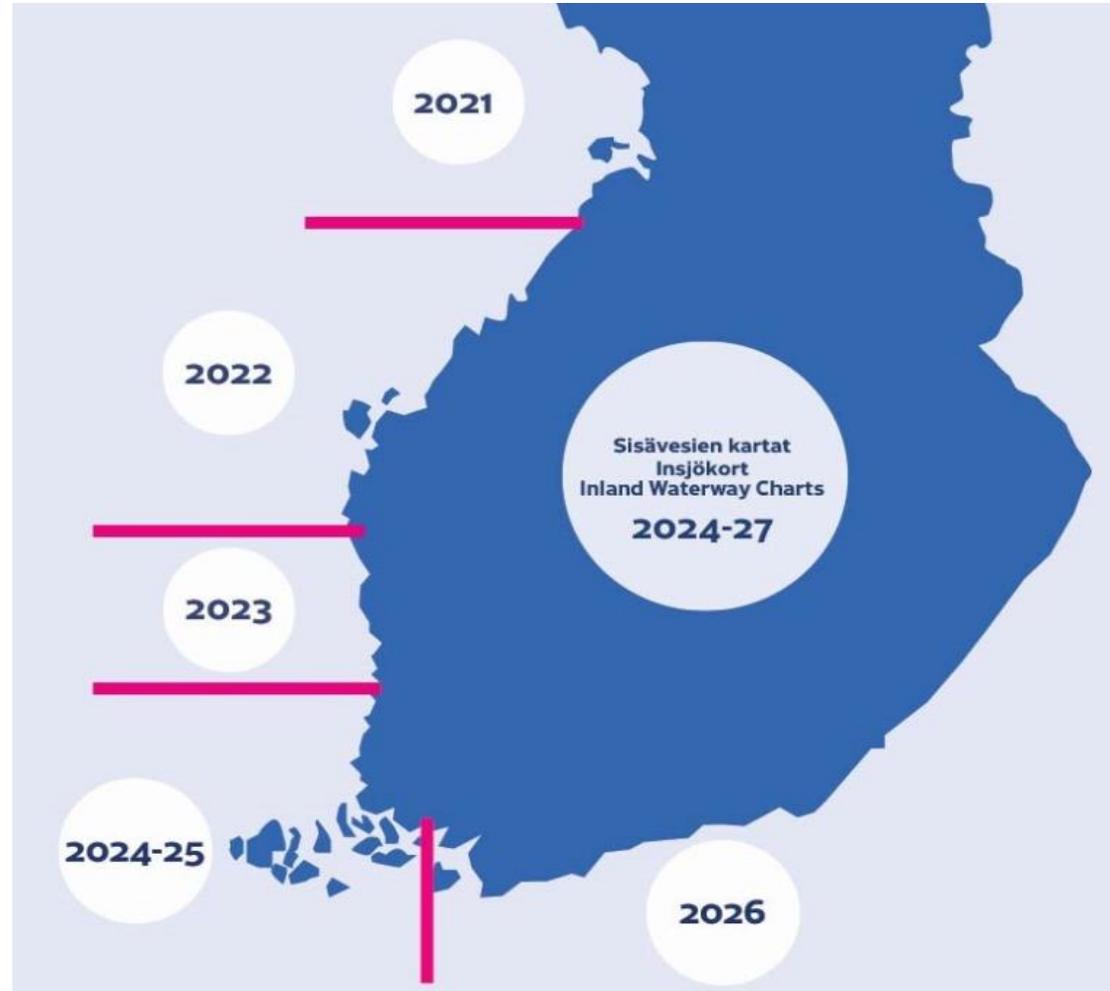


# Finland - implementation status BSCD2000

## ENC approach in N2000/BSCD2000:



## Production schedule of N2000/BSCD2000 in nautical charts:

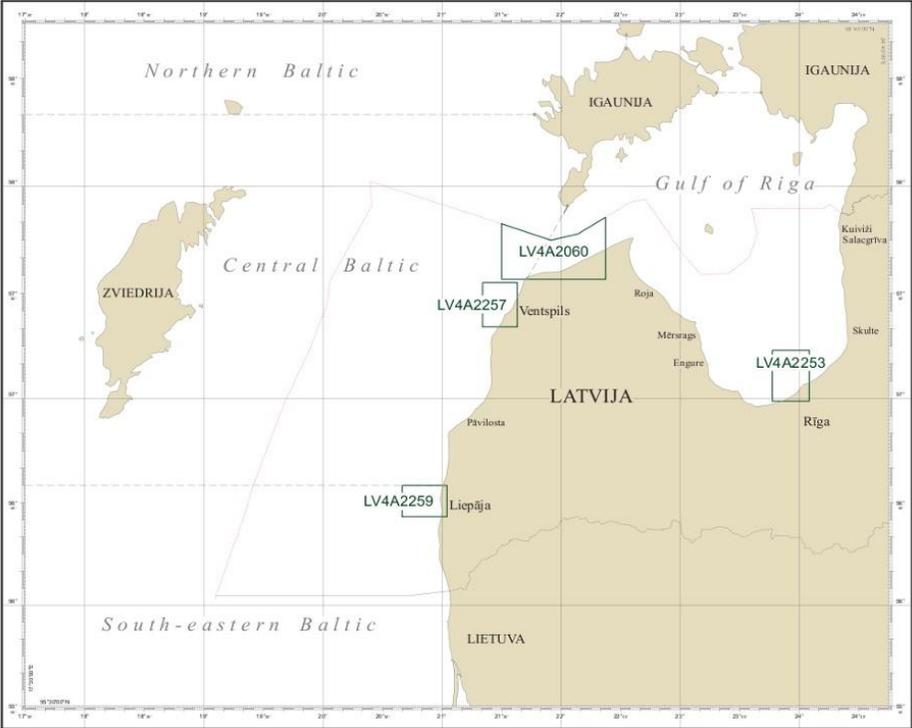




# Latvia - implementation status BSCD2000

## ENC from Latvia:

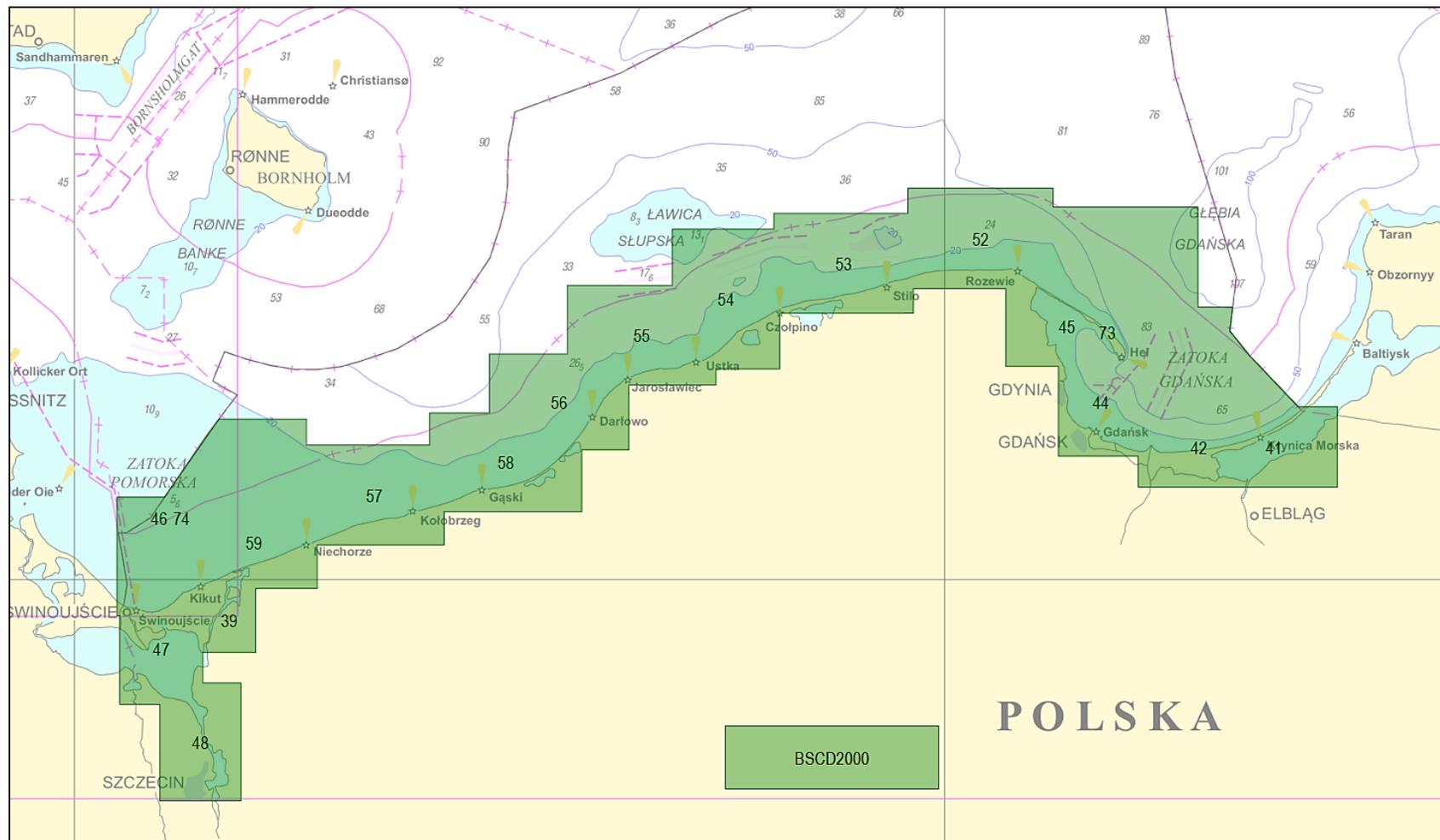
PIEEJAS ENC KARŠU SHĒMA / APPROACH ENC (USAGE 4) OVERVIEW



All Paper Charts since 24.01.2024. are implemented to BSCD2000, LAS-2000,5  
All approach and other scale band ENC's are implemented to BSCD2000, LAS-2000,5

# Poland - implementation status BSCD2000

## Implementation done (approach band only):



All PL nautical charts are now referring to PL-EVRF2007-NH (BSCD2000) reference system.

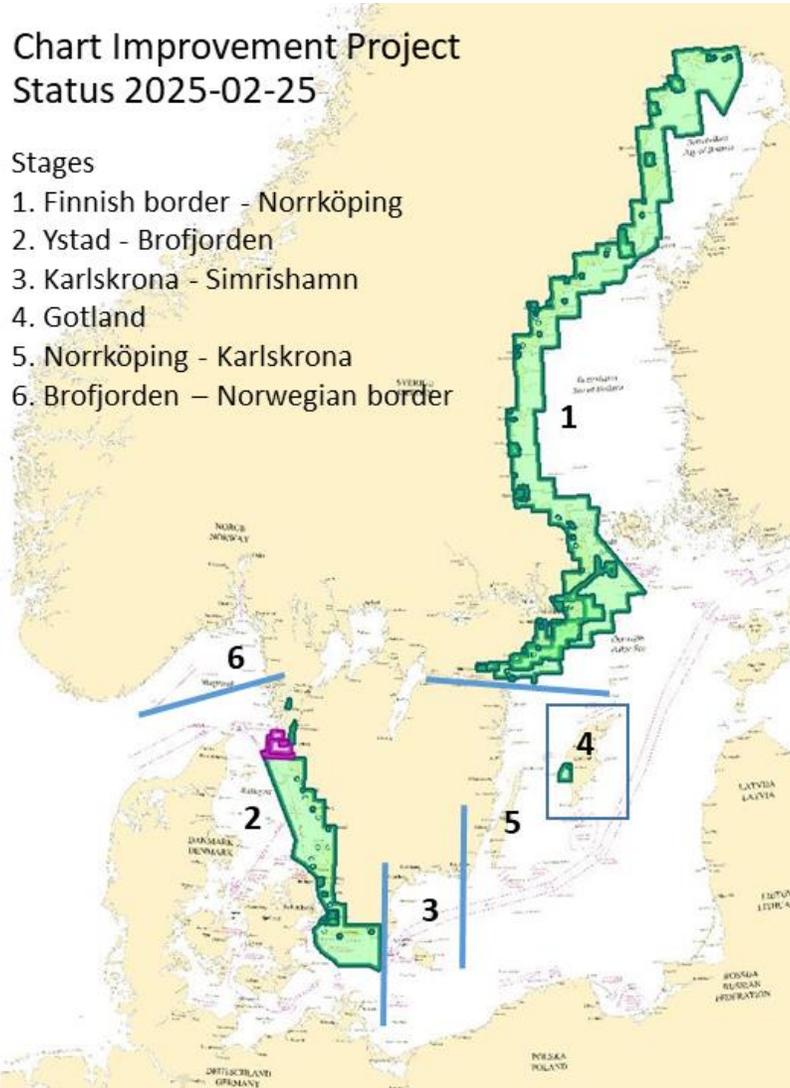


# Sweden – implementation status BSCD2000

## Chart Improvement Project Status 2025-02-25

### Stages

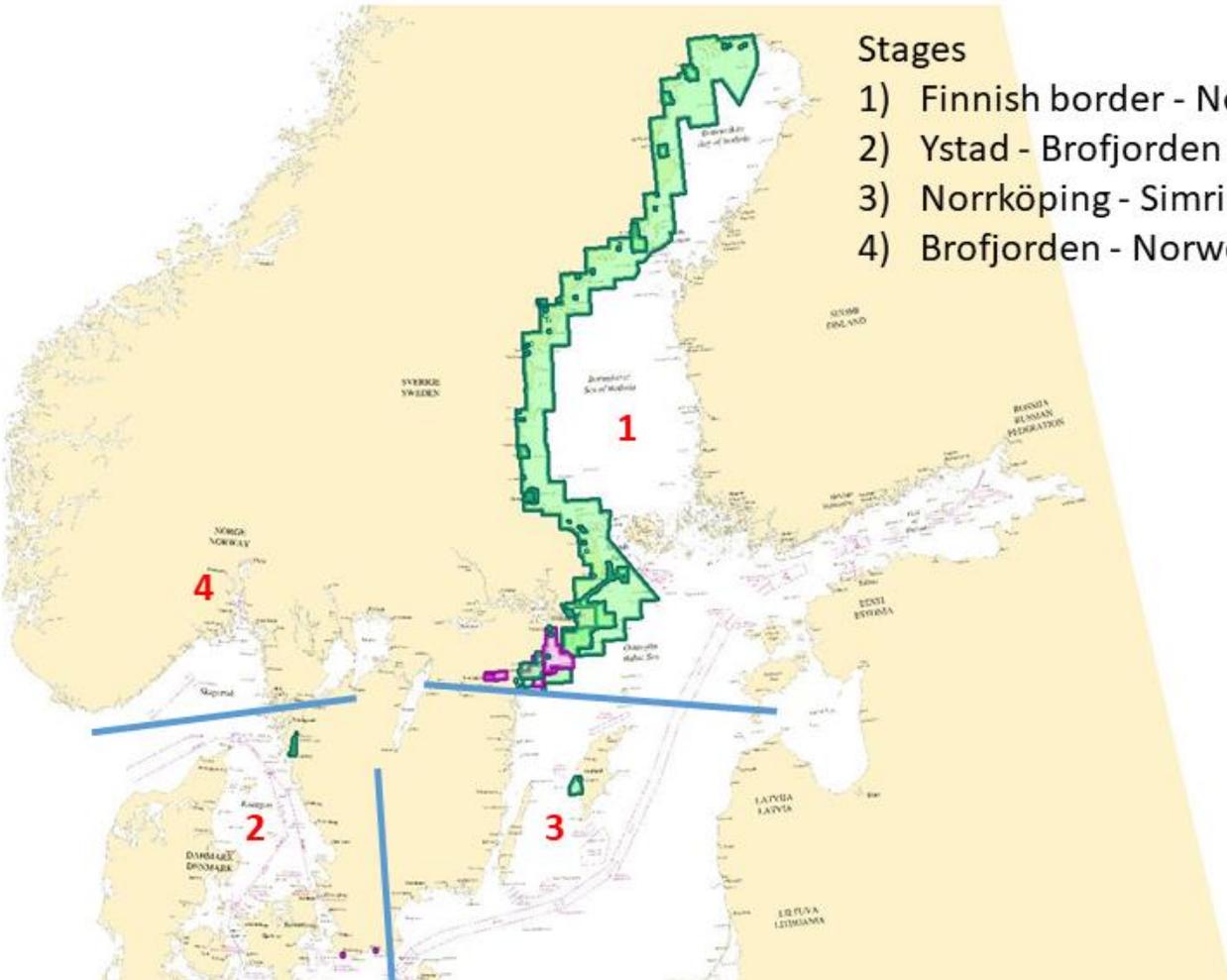
1. Finnish border - Norrköping
2. Ystad - Brofjorden
3. Karlskrona - Simrishamn
4. Gotland
5. Norrköping - Karlskrona
6. Brofjorden – Norwegian border



## Chart Improvement Project (status 2024-03-19)

### Stages

- 1) Finnish border - Norrköping
- 2) Ystad - Brofjorden
- 3) Norrköping - Simrishamn
- 4) Brofjorden - Norwegian border



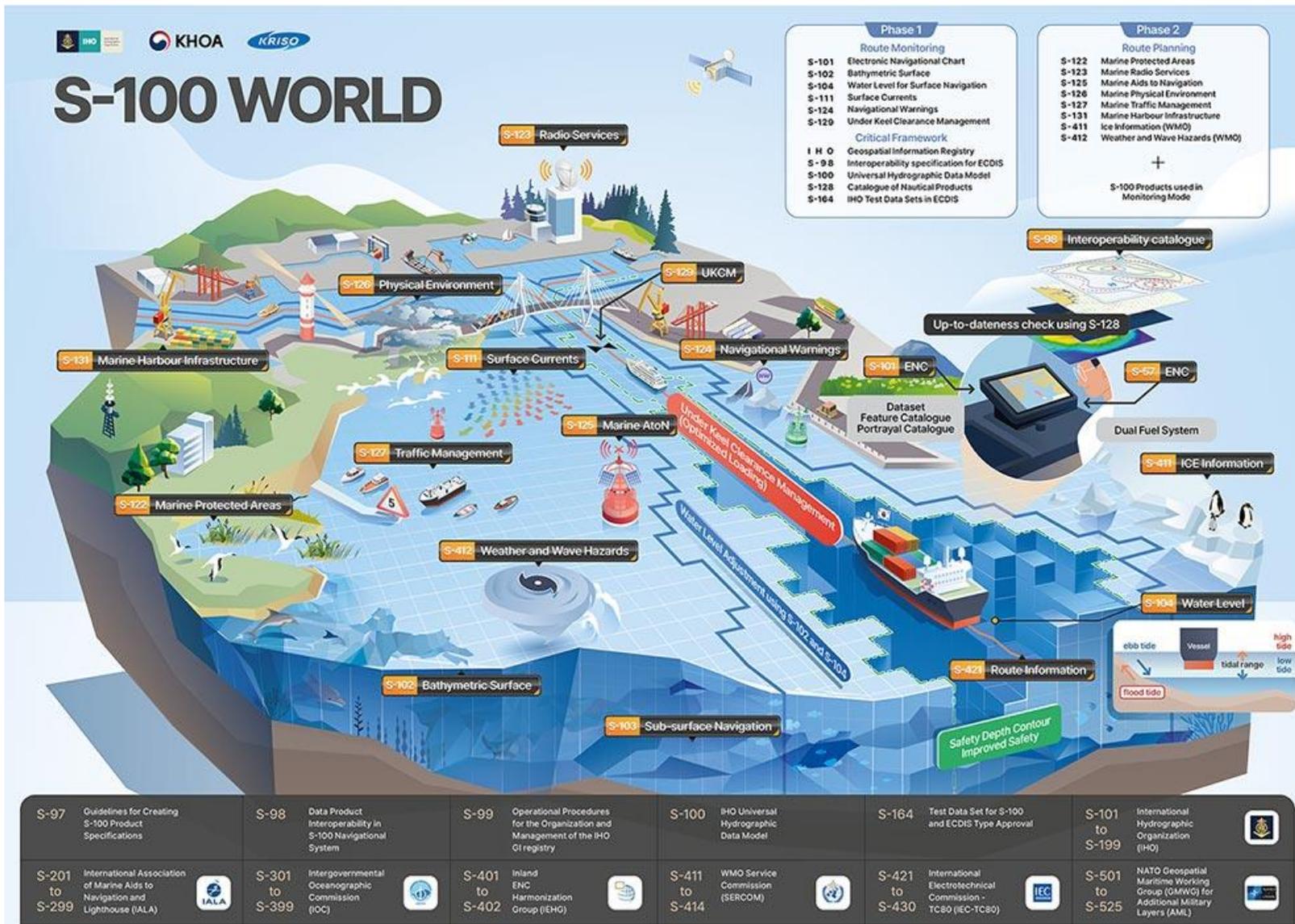
# Implementation status 2025

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

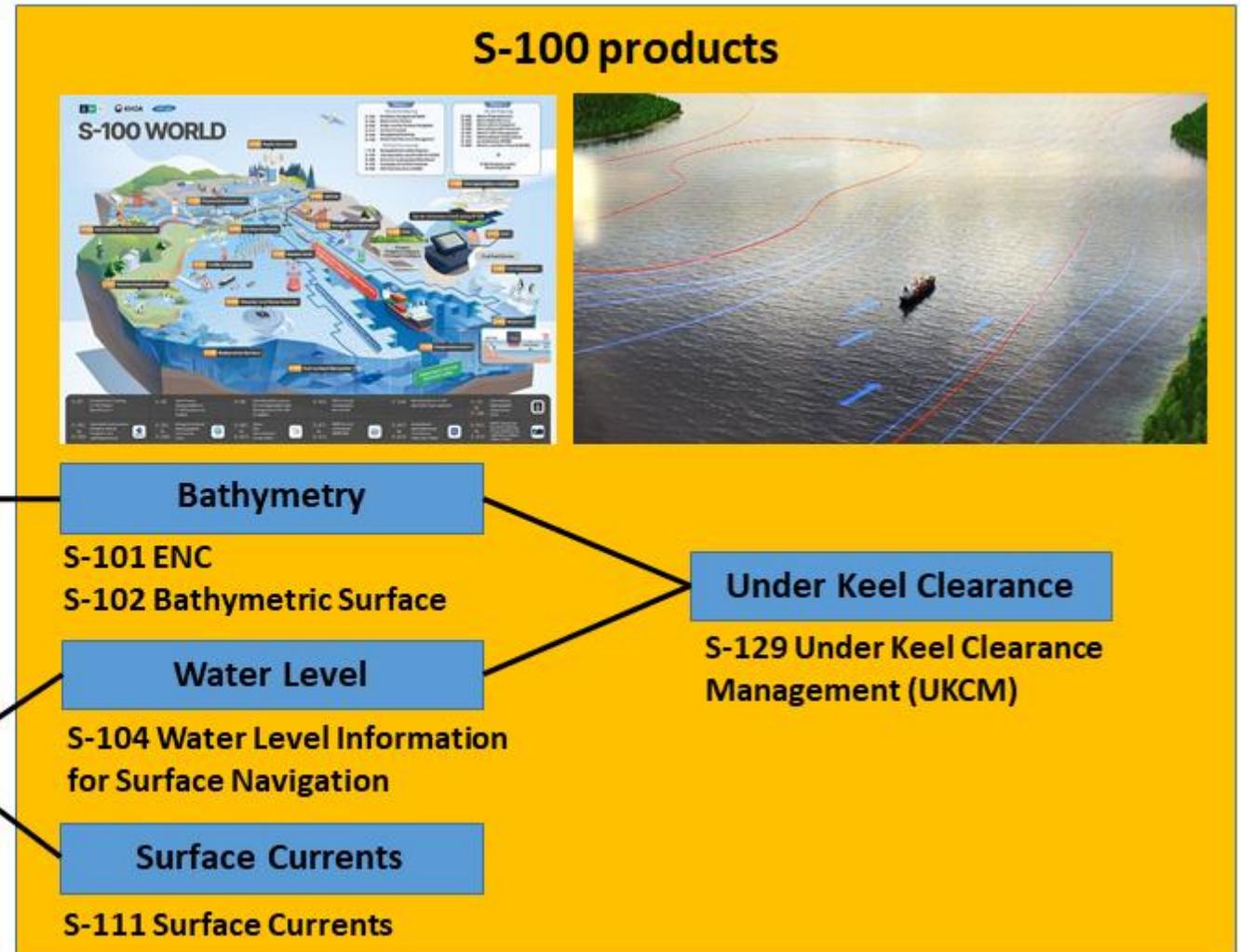
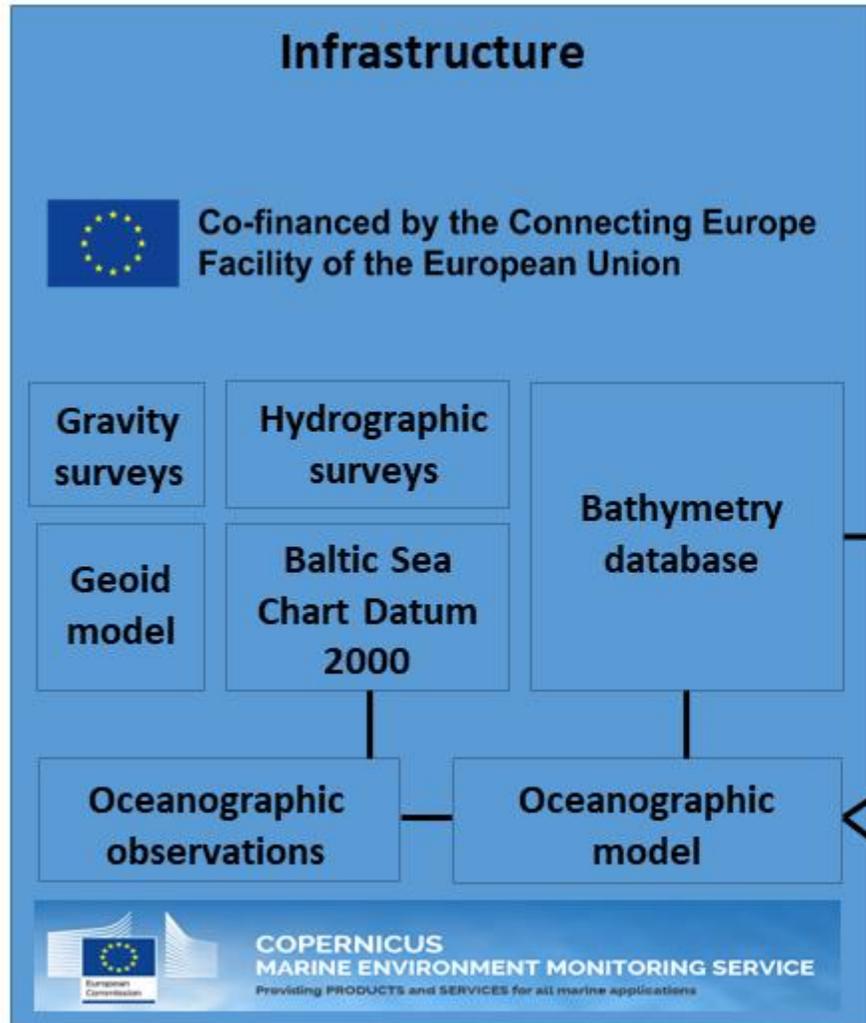
Country	Status BSCD2000 for charts	Status BSCD2000 for water level (see <a href="#">mwreg_boos</a> )	Status S-104/S-111
<a href="#">Denmark</a>	Chart datum in practice close to EVRS-based chart datum (DVR90). BSCD2000 is implemented in ENC and will be implemented in paper charts in the order of reprinting.	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 (Forsvaret 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="#">Nukimer</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 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.  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>  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 Klaipeda 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.	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 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.

2025-03-25

# Future Maritime Services S-100



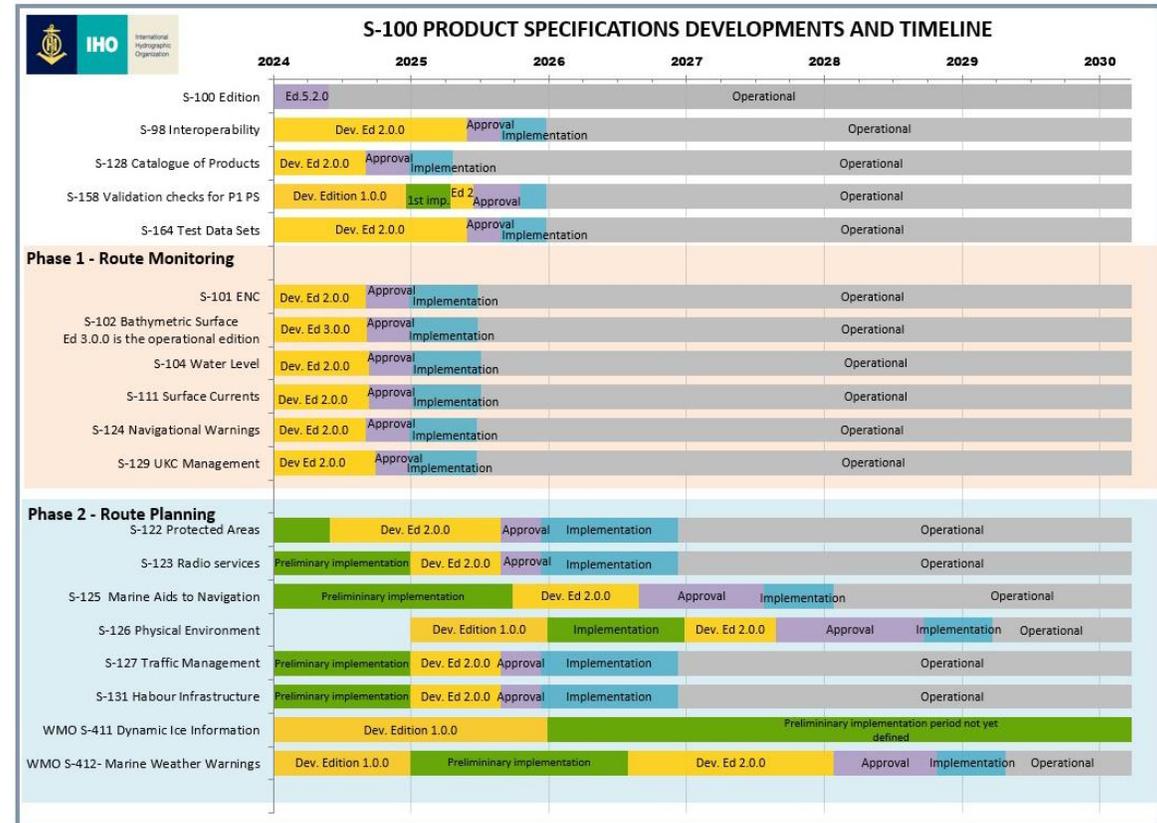
# Real Time Hydrographic and Environmental Information Service



# S-100 Implementation

## IHO S-100 Implementation Strategy

Table A – IHO list of S-100 products with special focus	
<b>First step – Route monitoring mode</b>	
<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
<b>Critical Framework</b>	
	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
<b>Second step – Route planning mode</b>	
<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



# S-100 Implementation Sweden

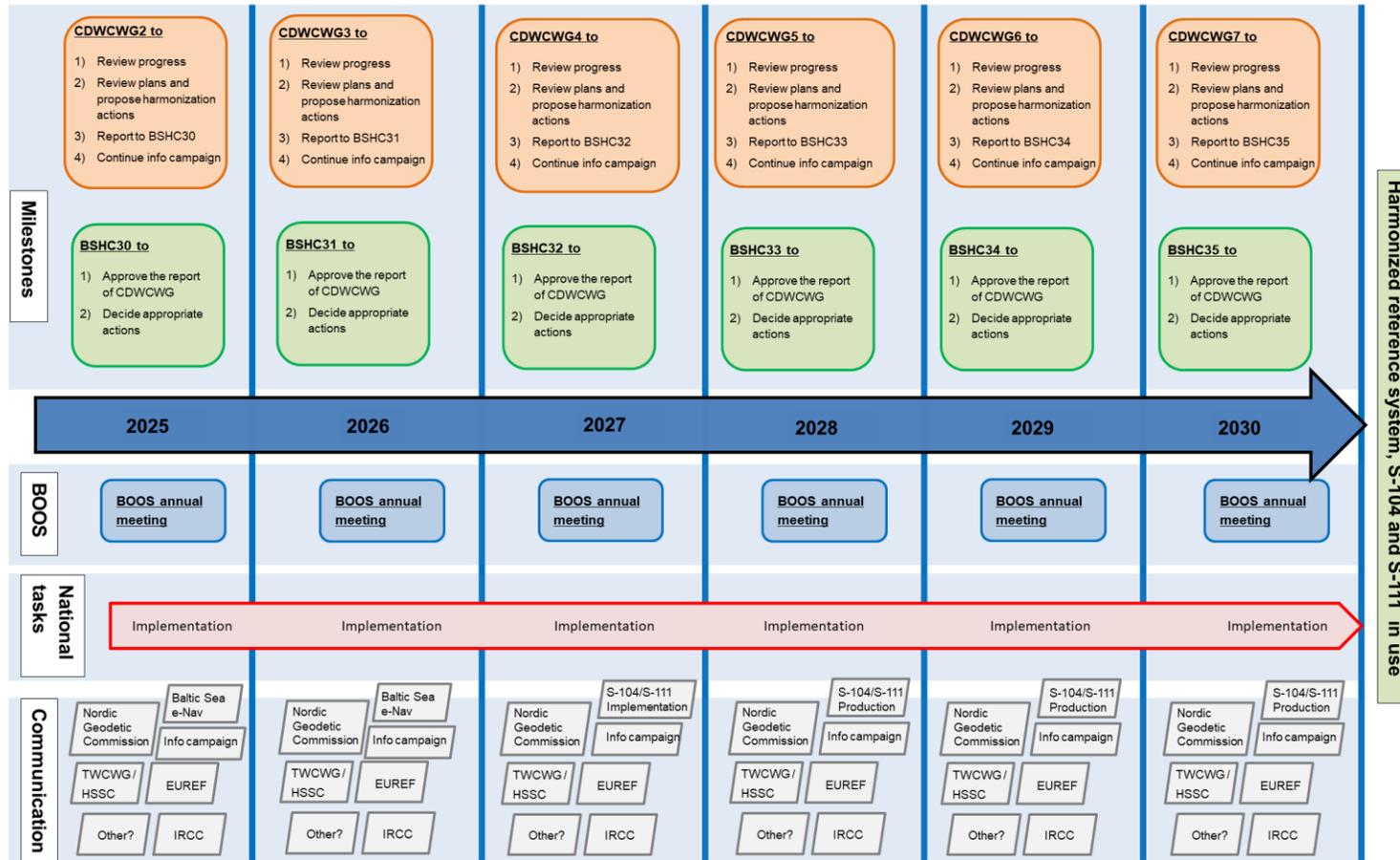
Products	2024	2025	2026	2027	2028	2029	2030	2031	2032
ENC S-101									
Bathymetry S-102									
Ensuring confidentiality rules for S-102									
Catalogue of Nautical Products S-128 via PRIMAR									
Water Level S-104 (in cooperation with SMHI*)									
Surface Currents S-111 (in cooperation with SMHI*)									
Navigational Warnings S-124									
Marine Protected Areas S-122 (in cooperation with SwAM*)									
Marine Radio Services S-123									
Marine Traffic Management S-127									
Marine Harbour Infrastructure S-131									

\*SMHI – Swedish Meteorological and Hydrological Institute, SwAM – Swedish Agency Marine and Water Management



# CDWCWG Roadmap

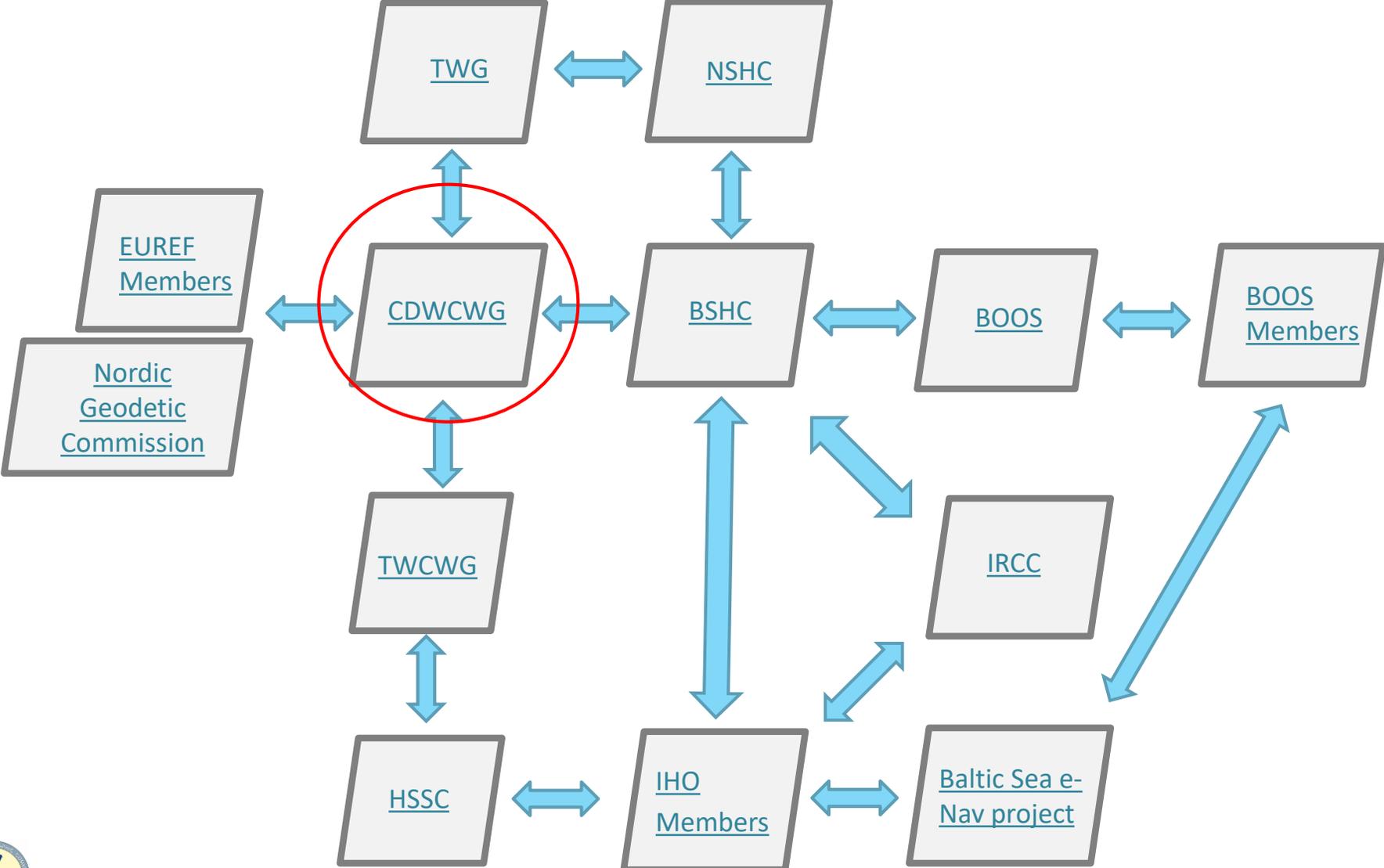
## RoadMap BSHC CDWCWG / Harmonized Reference System / S-104 and S-111 Implementation / Time Line 2024-10-11



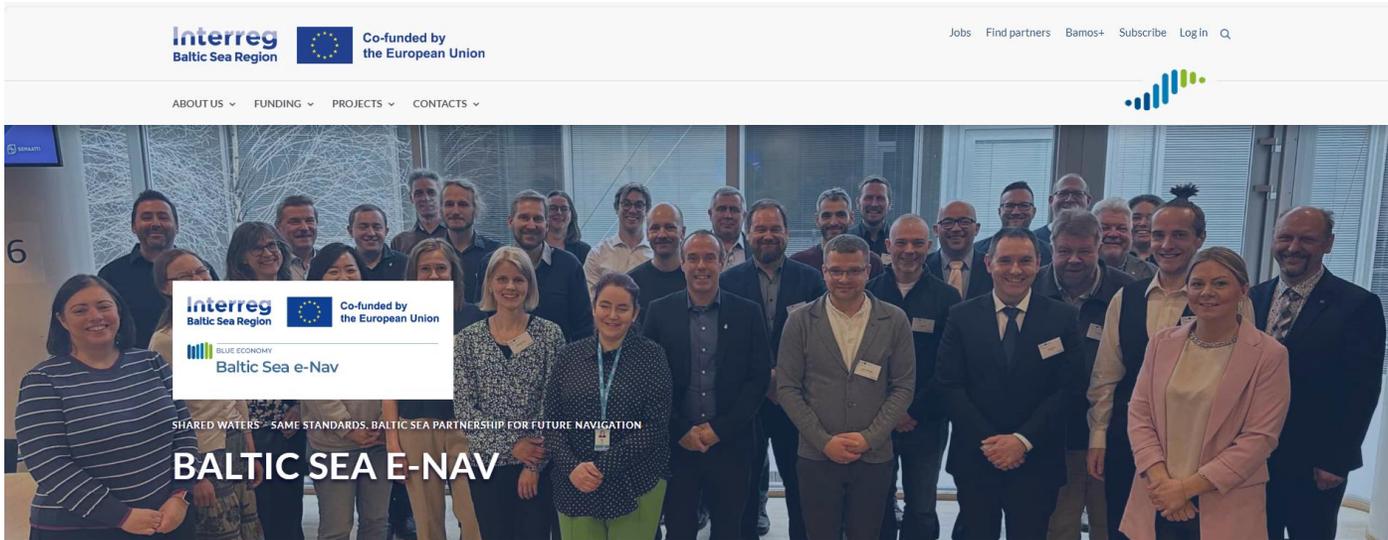
Harmonized reference system, S-104 and S-111 in use



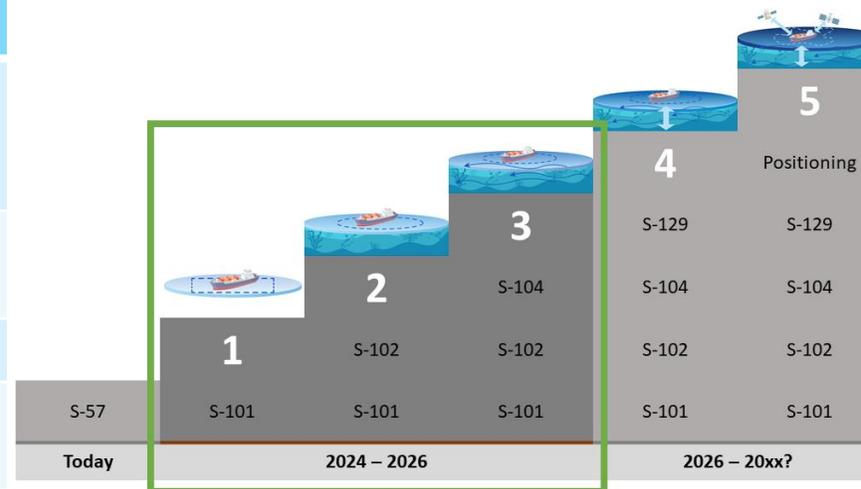
# CDWCWG International relations



# 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



# Baltic Sea e-Nav

- A project to start the implementation of the S-100 products in the Baltic Sea
- Transnational cooperation: Partners from almost all Baltic Sea countries.
  - Mainly hydrographic offices, developing S-101 (ENC) and S-102 (Bathymetry) products
  - Finnish Meteorological Institute as the only oceanographic service in the project is also responsible to arrange co-operation to other providers of oceanographic data in the Baltic.
    - Developing S-104 and S-111



# Baltic Sea e-Nav – Financing



- Programme Interreg Baltic Sea Region
- Postponed with one year after rejection of the project the first attempt (September 2022)
- Financing approved (June 2023)
- Approximately 5 Meuro

**Interreg**  
Baltic Sea Region



**Co-funded by  
the European Union**

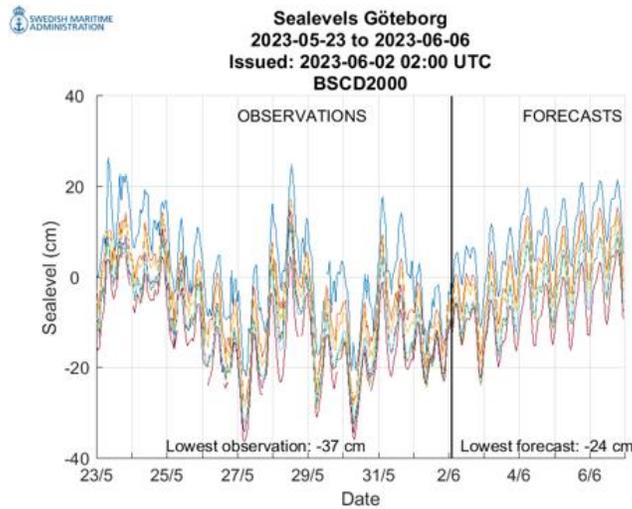
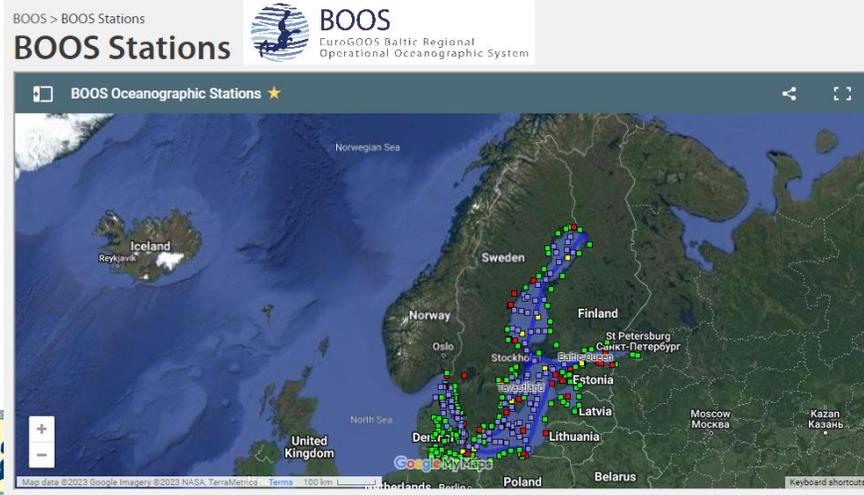
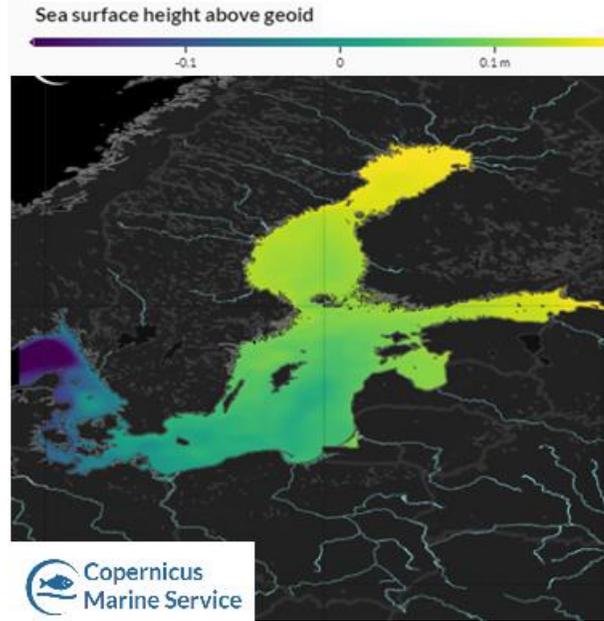
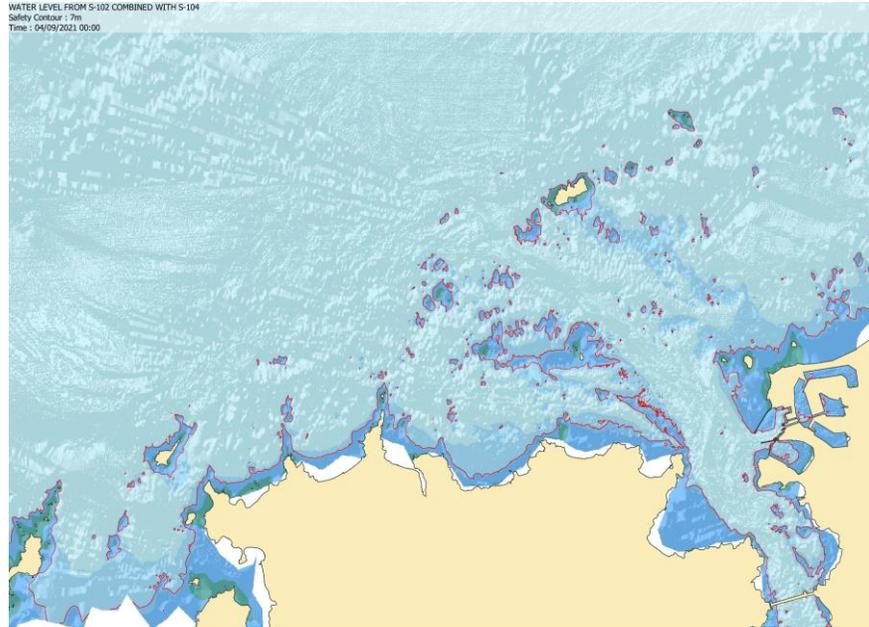


# Harmonization and validation issues

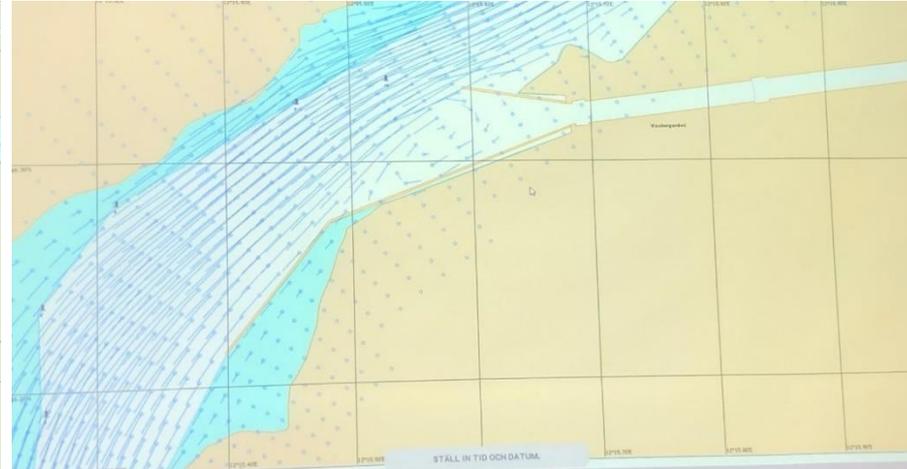
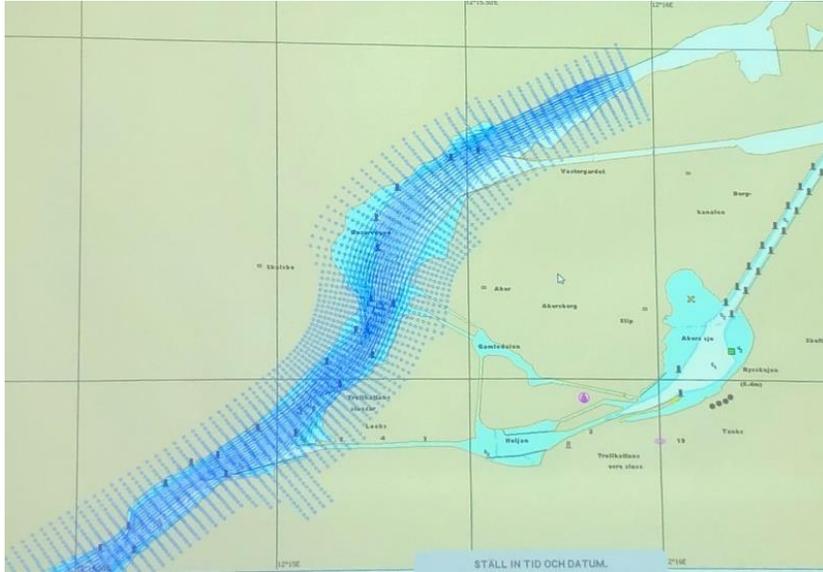
- Coordination of S-104 and S-111 in the Baltic Sea: Chart Datum, Water level and Currents Working Group ([CDWCWG](#))
- S-104/S-111 production capabilities have been developed in the Baltic Sea, as a part of the Baltic Sea e-Nav project
- Responsibility for producing lies with the MetOcean Institutes of different countries
- So far, only some of the MetOcean Institutes have been active. However, there will be a joint meeting to try to get everyone involved.
- What is wrapping: HDF5 file acquisition, validation and signing?
- What is included in validation? A full validation according to S-158?
- There have been discussions about harmonization and the need for it;
  - o Technical harmonization rules, i.e. the interoperability with S-102 (see [S-98](#), i.e. WLA=Water Level Adjustment - described in Part C and [Cross-validation S-158:98](#))
  - o National implementation
  - o Production areas between member states/overlapping data
  - o Need for a roll out plan
  - o A report from BSHC to WENDWG15 will include issues on paper charts, S-57 ENCs and the implementation of the S-100 schedule and capabilities in the Baltic Sea
  - o [Guidelines in the Implementation of the WEND-100 principles](#)



# S-104 Water Level



# S-111 Surface Currents



# Future Navigation



Thanks!



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