



**BALTIC SEA
HYDROGRAPHIC
COMMISSION**



IHO

Chair's Report to CDWCWG1

1st CDWCWG Meeting

26-27 March 2024

Helsinki, Finland

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 Working Group 14th meeting, 28-29 March 2023, Göteborg, Sweden

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

Members of CDWCWG:

Denmark	Mr Nikolaj Møller
Denmark	Mr Kristian Villadsen Kristmar
Estonia	Mrs Gabriela Kotsulim
Finland	Mr Jyrki Mononen
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
https://www.bshc.pro/wp-content/uploads/CDWCWG1_MemberList.pdf	
Sweden	Mr Thomas Hammarklint (Chair)
Sweden	Mr Lars Jakobsson
Sweden	Mr Henrik Tengbert

Observers and Experts:

Estonia	Prof. Artu Ellmann
Estonia	Dr Sander Varbla
Finland	Mr Jarmo Mäkinen
Finland	Dr Mirjam Bilker-Koivula
Finland	Dr Timo Saari
Finland	Mrs Anni Jokiniemi
Germany	Dr Gunter Liebsch
Germany	Dr Joachim Schwabe
Latvia	Mr Armands Murans
Latvia	Mr Kristis Dzenis
Lithuania	Mr Emilis Tertelis
Lithuania	Mr Romuald Obuchowski
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

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 and for water level information:

Mean Sea Level (Baltic Sea Chart Datum 2000^{national realization name})

Mean Sea Level (Baltic Sea Chart Datum 2000)

Baltic Sea Chart Datum 2000^{national realization name}

Baltic Sea Chart Datum 2000

BSCD2000 (national realization name)

BSCD2000


CHART DATUM: Mean Sea Level (Baltic Sea Chart Datum 2000^{RH2000})
REFERENSNIVÅ: Medelvattenyta (Baltic Sea Chart Datum 2000^{RH2000})
SYMBOLS and ABBREVIATIONS: see INT 1
BETECKNINGAR och FÖRKORTNINGAR: se KORT 1

Referensnivå



Baltic Sea Chart Datum 2000 in IHO GI Registry

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



IHO
International
Hydrographic
Organization

HOME <

HELP&GUIDANCE <


GI REGISTERS <

PROPOSAL <

TEST BED <

Open Online Platform <

2nd GI Registry(Old) <



KHOA
Republic of Korea

IHO Geospatial Information Registry

Please sign in Sign in Join

KHOA Korea Hydrographic and Oceanographic Agency

Data Dictionary Register

Home / GI REGISTERS / Data Dictionary Register


Feature Type 366 Information Type 26 Attribute Type 667 Complex Type 92 Enumeration Value 2273 Codelist Value 117

Domain ALL Status Valid Type ALL Category Name

[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	Attribute type	Name
	Enumerated type	Vertical Datum
Reference		
Reference Source	Baltic Sea Hydrographic Commission	

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 KHOA Acknowledgements



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. Schwabe¹, J. Agren², G. Ledsich³, P. Westöf⁴, T. Hammarik⁵,
J. Mononen⁶ and O. B. Andersen⁶

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 on land. 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 Système de Référence Vertical Européen (EVRS) et au Système de Référence Terrestre Européen (ETRS89). En particulier, le zéro hydrographique 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 commun 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 du GNSS comme le GPS, GLONASS et Galileo pour une navigation et des levés hydrographiques précis à l'avenir.

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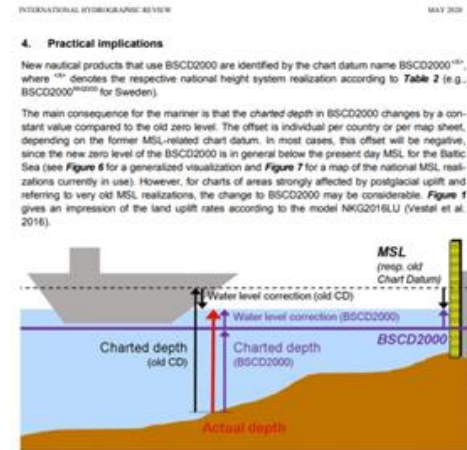


Figure 8: Schematic cartoon of the old MSL-based chart datum and the new BSCD2000

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

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INTERNATIONAL HYDROGRAPHIC REVIEW MAY 2020

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 IHRs 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/working-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.

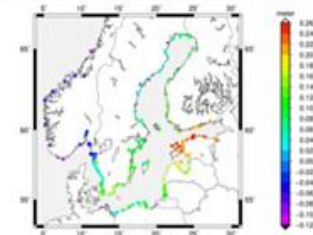
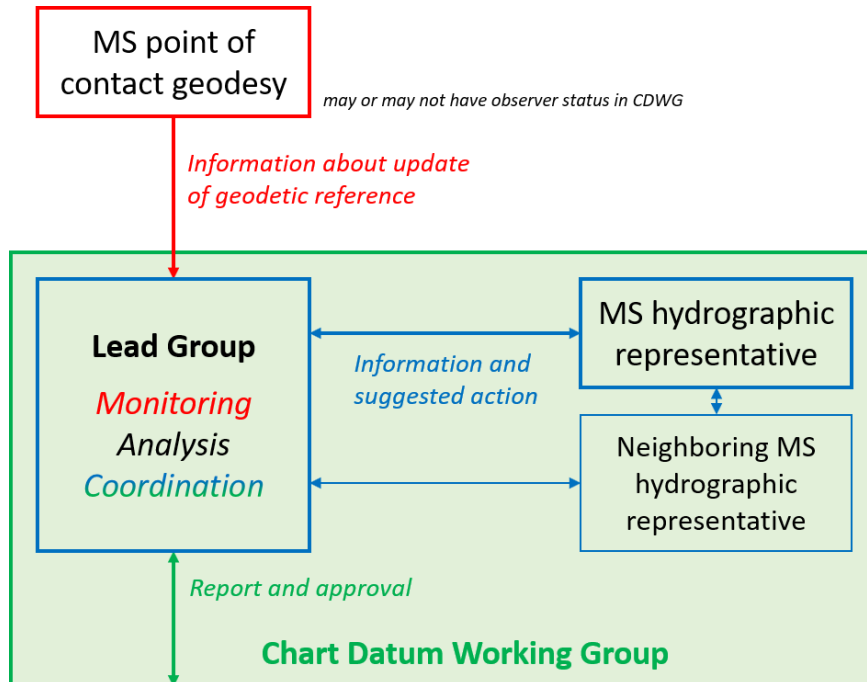


Figure 7: Differences between the reference levels of the old national chart datums with respect to Baltic Sea Chart Datum (BSCD2000). In Sweden and Finland, the old reference levels are equal to the calculated MSL in the year 2020 (according to different national conventions). The values from Norway show the MSL over the period 1996-2014, relative BSCD2000^{NOR}. In Estonia, Latvia and Lithuania, the Kronstadt reference level is used as old chart datum. In Poland, the local Polish Height System Amsterdamszki (Np) 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).

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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>

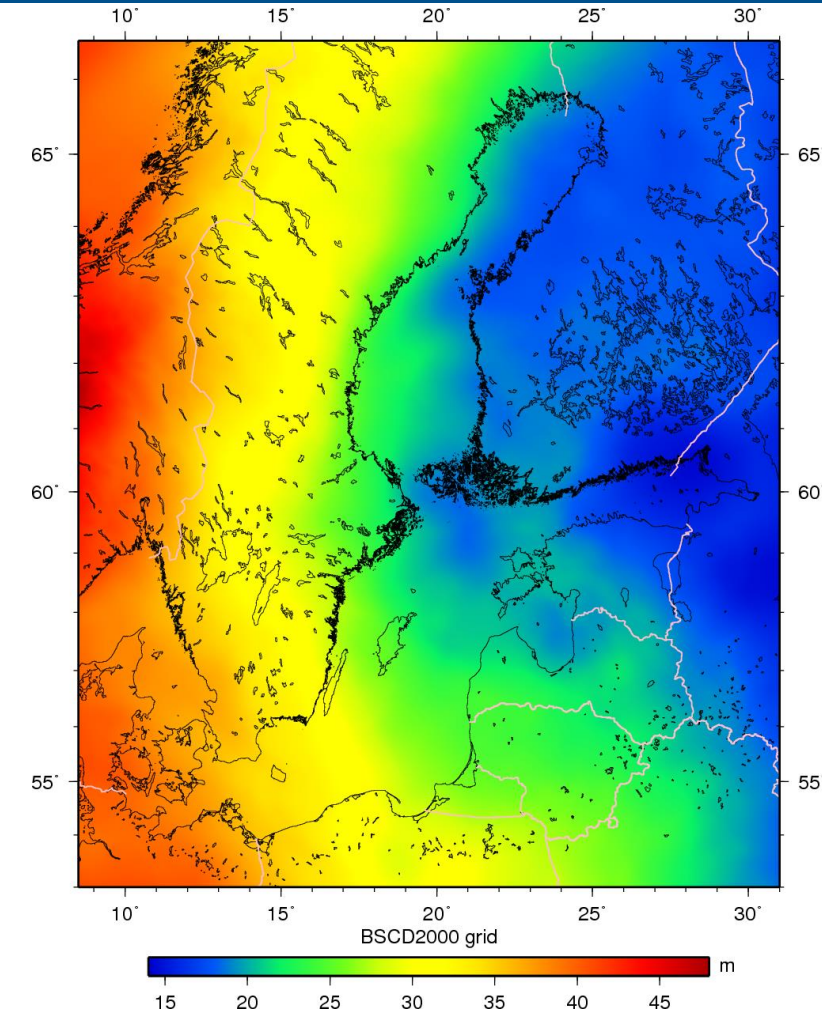
Digital Object Identifier (DOI) with download

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 References



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 28th 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 28th 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.

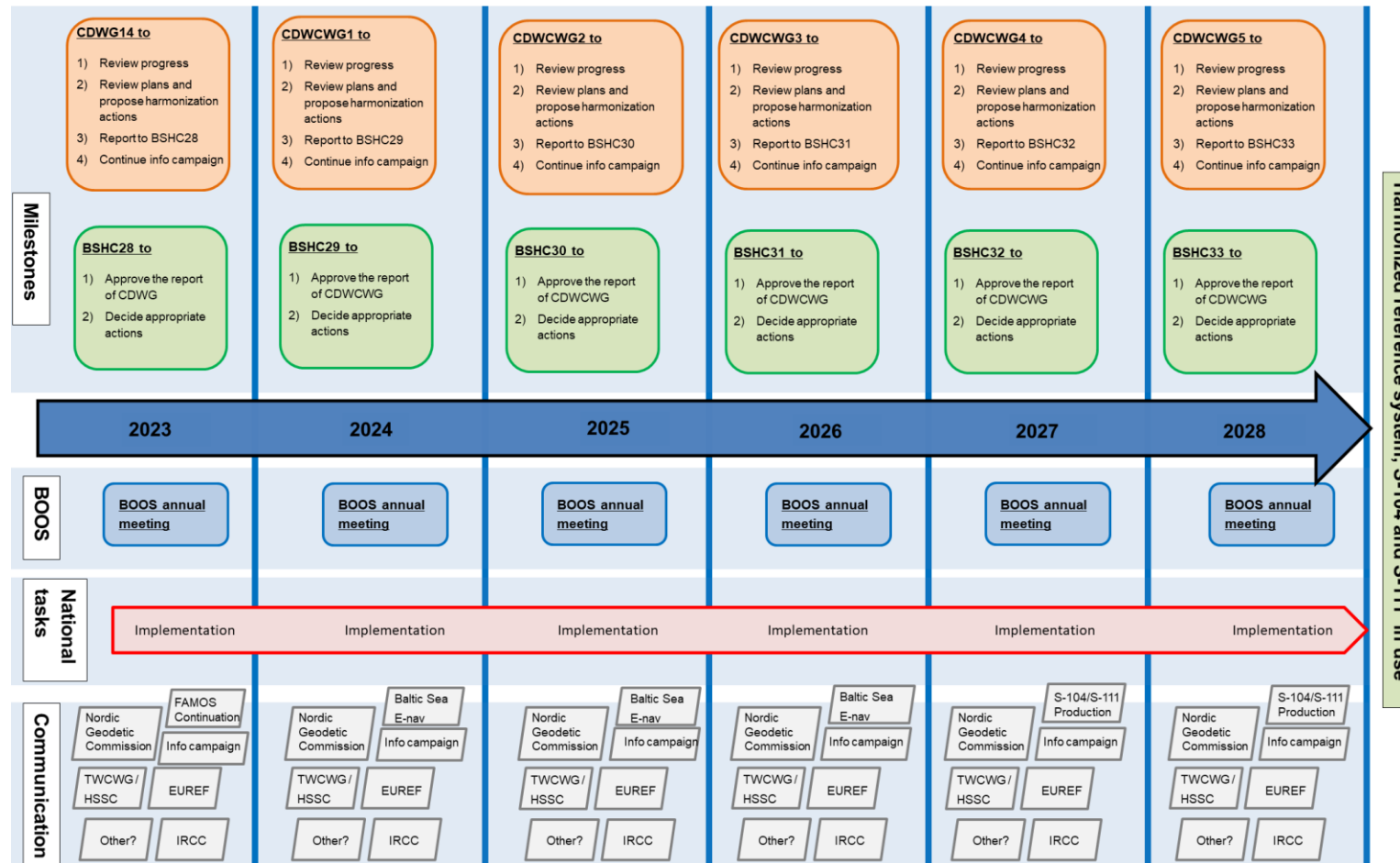
Tasks:

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.

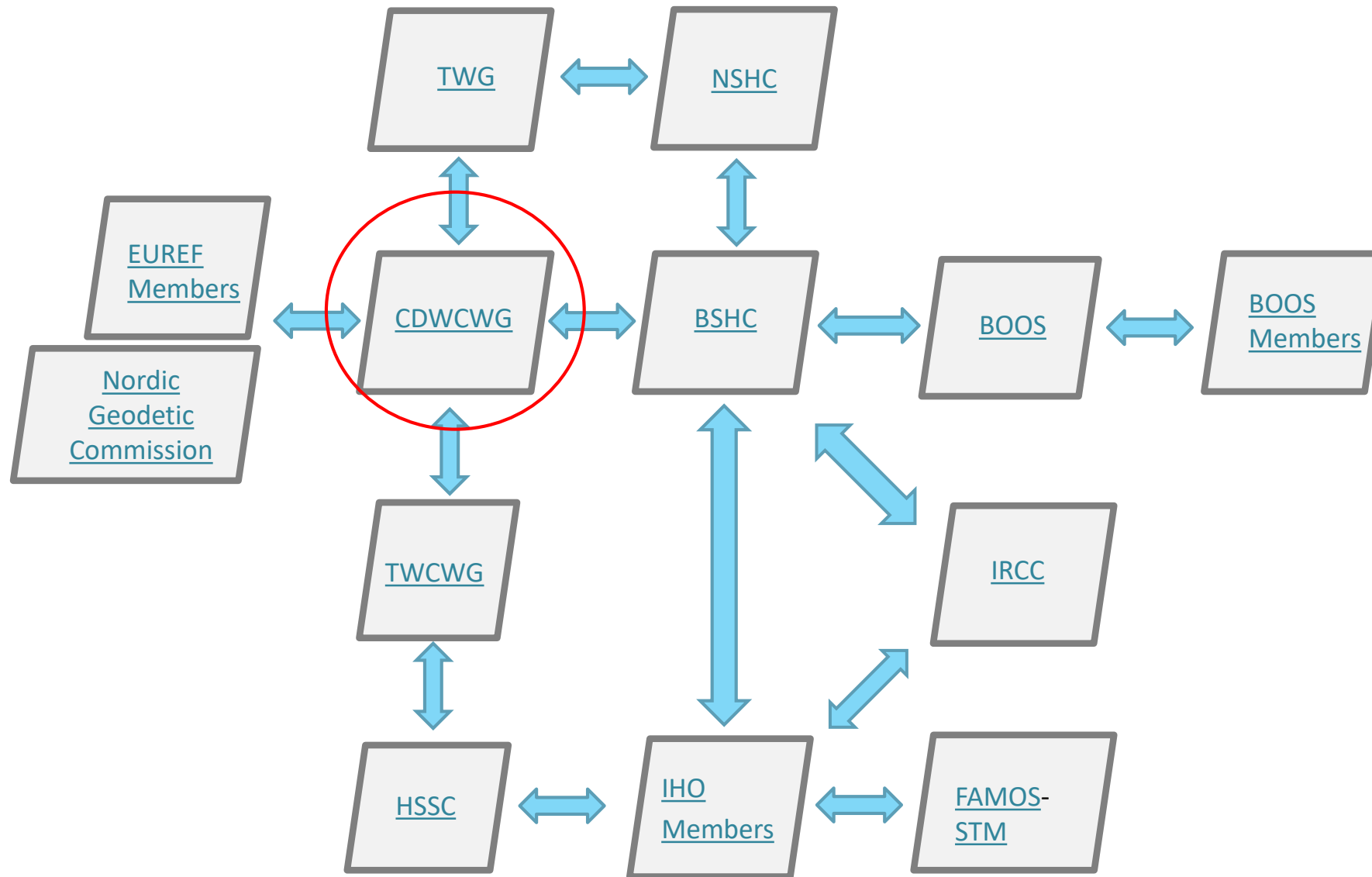


CDWCWG Roadmap

RoadMap BSHC CDWCWG / Harmonized Reference System / S-104 and S-111 Implementation / Time Line 2023-12-18



CDWCWG International relations



CDWG14 List of Actions

BSHC Chart Datum Working Group



List of Actions BSHC CDWG14 28-29 March 2023 Göteborg, Sweden

Action #	Who	Action	Time schedule	Remarks/Status
1	All	Renaming of the working group: Chart Datum, <u>Water level</u> and <u>Currents</u> Working Group (CDWCG). Report to BSHC28.	BSHC28 meeting 19-21 September 2023	Done 2023-09-20 New name of the working group approved
2	All	Update <u>the ToRs</u> and <u>Work programme</u> . Report to BSHC28.	BSHC28 meeting 19-21 September 2023	Done 2023-09-20 New <u>ToRs</u> and <u>Work programme</u> approved
3	All	<u>Elect a permanent secretary for the working group</u>	BSHC28 meeting 19-21 September 2023	Done 2023-09-20 No permanent secretary elected
4	Anna	<u>Draft Minutes</u> to Chair	2023-04-15	Done 2023-04-14
5	Chair	To check the draft <u>Minutes</u> and send to participants for comments	2023-04-15	Done 2023-04-14
6	Participants	To comment the draft <u>Minutes</u>	2023-04-26	Done 2023-04-26
7	Chair	To send the final <u>Minutes</u> to all members	2023-04-28	Done 2023-04-29
8	Chair	<u>CDWG report to BSHC28</u>	2023-08-11	Done 2023-08-08
9	Chair	<u>CDWG presentation at BSHC28</u>	BSHC28 meeting 19-21 September 2023	Done 2023-09-20
10	Chair and Jonas	Update Figure 4b in the <u>Specification of the Baltic Sea Chart Datum 2000</u>	2024-03-26	
11	Chair	Chair to organize a <u>CDWCG1 meeting</u> , 26-27 March 2024 in Helsinki, Finland	2024-03-26	
12 (same as #3 in previous meeting)	Chair	Chair will arrange a meeting with people from DTU Space, GST and DMI in Denmark about the differences we see between Swedish and Danish water levels	Before next CDWG-meeting	
13	Joachim and Patrick	Prepare a suggestion for continuity management of the BSCD2000 geoid	2023-08-31	Done 2023-08-31

CDWG14 ActionList

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4 March 2024

BSHC Chart Datum Working Group



14 (same as #19 in previous meeting)	Anna	Find conceptual alternative to solve the future need of a 3D "Baltic Geodetic System" - adapting to BSCD2000 with known relationship to <u>ITRFxx</u> - to implement in coming S-100 concept making it possible to handle GNSS supported UKC management. Action for next meeting: Monitor international development in precise positioning for navigation and UKCM, and the need for a link between the ITRS and the national realizations of ETRS.	At next CDWG-meeting	
15	Joachim	Finalize BSCD2000 geoid for last minute updates and circulate grid	2023-08-31 2023-09-30	Done 2023-10-10
16	Chair and Patrick	Prepare <u>download of the BSCD2000 geoid grid via BSHC with DOI from IHO</u>	2023-09-30 2023-10-31	Done 2023-10-20
17	Joachim and Patrick	Prepare release note in IHR https://doi.org/10.58440/ihr-29-2-n11	2023-08-31 2023-09-30	Done 2023-09-30
18	Chair and Joachim	Coordinate planned national public outreach activities (landing pages, notes to mariners etc.)	2023-09-30 2023-11-30	Done 2023-11-23
19	All	Coordinate updates of national geoid models for BSCD2000 in the marine area with Joachim, if applicable	2023-09-30 2023-11-30	Done 2023-11-23
20	Jonas	Revise the first line on page 4 in the <u>Specification of the BSCD2000</u>	2023-04-30	
21	Witold	Contact the BSHC Monitoring Working Group (MWG) to promote collection of bathymetry data for cartographic purposes in the Baltic sea with reference to the BSCD2000	2023-04-30	Done 2023-04-04
22	Patrick, Joachim and Chair	Suggestion for reformulation of the text in paragraph 4 in the New <u>ToR</u> . Germany will make a suggestion and the text will be circulated by the Chair before the BSHC meeting in September 2023	2023-08-31	Done 2023-08-08
23	Anna-Chair	Review the Road Map and make suggestions for updates considering both S-104, S-111 and the 3D reference system – will be circulated by the Chair	2023-04-30	Done 2023-12-20 3D reference system (see #14) not included
24	Chair	Ask the BSHC Strategic Correspondence Group (<u>BS-SCG</u>) for guidance on how to proceed with new members to cover the new tasks related to S-104 and S-111	Before their next meeting	2023-09-20 BS-SCG terminated at BSHC28, no further guidance given to CDWCG

CDWG14 ActionList

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4 March 2024



Outcome from BSHC28/2023

One action were given from BSHC28 to CDWCWG:

BSHC28/5 C.3: Encourage experts in Oceanographic and Meteorological organisations to contribute CDWCWG work

One decision were taken:

BSHC28/3 C.3:BSHC28 endorsed new name for the CDWG, a new name is "Chart Datum, Water level and Currents Working Group (CDWCWG)"

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



Meetings and major outcomes 2023

- NSHC TWG25, 7 February 2023, VTC

[Website](#) / [Minutes](#)

- TWCWG7, 28 February - 2 March 2023, VTC
Development of S-104 Specification on Water level etc.

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

- BSHC Strategic Correspondence Group (BSHC-SCG), 15 March 2023, VTC

[Website](#)

- BSHC CDWG14, 28-29 March 2023, Göteborg, Sweden
Review and update of Actions since the last meeting
Received answers to the Questionnaire

[Website](#)
[Program](#) / [Agenda](#)
[Summary 2023](#)

- BOOS Annual meeting, 9-11 May 2023, Helsinki, Finland

[Website](#)
[CDWG Presentation](#)

- BSHC28, 19-21 September 2023, Helsinki, Finland
Present the CDWG work and new Actions to CDWG

[Website](#) / [Documents](#)
[CDWG Report](#) / [Presentation](#)



Meetings and major outcomes 2024

- NSHC TWG26, 6-7 February 2024, Göteborg, Sweden

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

- TWCWG8, 20-23 February 2024, VTC
Development of S-104 Specification on Water level etc.

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

- BSHC CDWCWG1, 26-27 March 2024, Helsinki, Finland
Review and update of Actions since the last meeting
Received answers to the Questionnaire

[Website](#)
[Program](#) / [Agenda](#)
[Summary 2024](#)

- BOOS Annual meeting, 6-8 May 2024, Copenhagen, Denmark

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

- BSHC29, 17-19 September 2024, Tallinn, Estonia
Present the CDWCWG work and new Actions to CDWCWG

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

- TWCWG9, 19-22 November 2024, Monaco
Development of S-104 Specification on Water level etc.

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



Meetings and major outcomes 2025

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

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

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

[Website](#)

- BOOS Annual meeting, 5-7 May 2025, TBC

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

- BSHC30, 16-18 September 2025, Riga, Latvia
Present the CDWCWG work and new Actions to CDWCWG

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

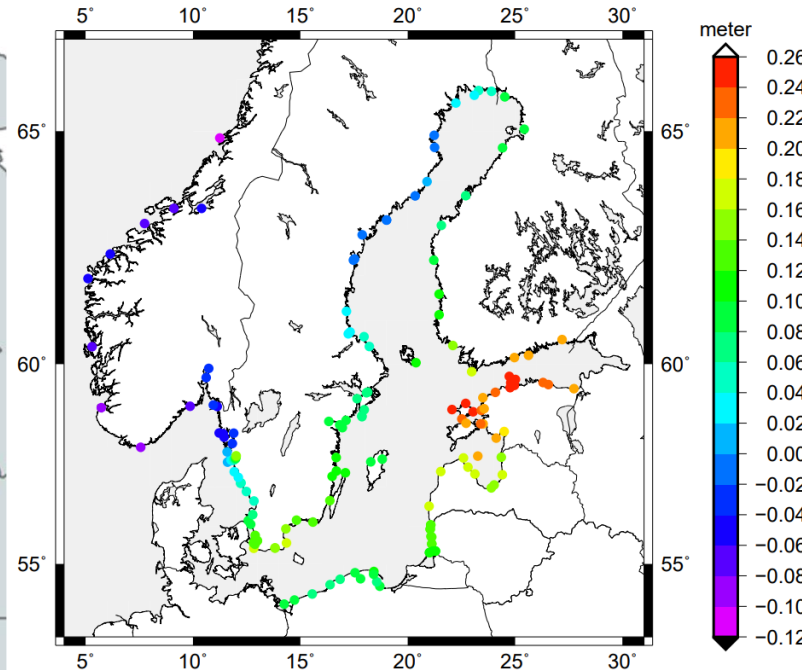
- TWCWG10, 4-7 November 2025, TBC
Development of S-104 Specification on Water level etc.

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



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

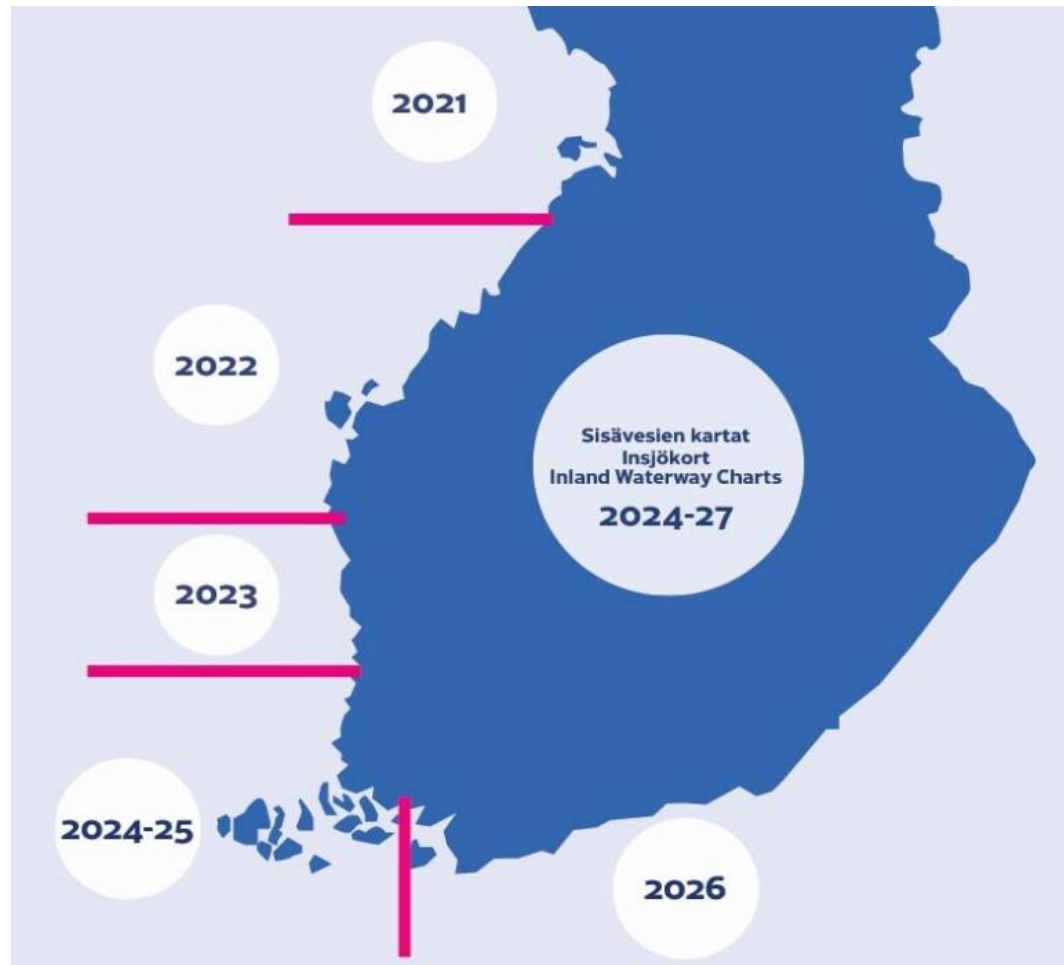
BSCD2000 = Baltic Sea Chart Datum 2000, heights referred to Amsterdam (NAP)
RH2000 = Swedish Height System 2000, heights referred to Amsterdam (NAP)
* = Correction of provided sea level data to BOOS to the Baltic Sea Chart Datum 2000 (BSCD2000)

COUNTRY	OWNER	NR	STATION NAME	LATITUDE	LONGITUDE	BSCD2000 cm	Apparent (relative) cm/year	Correction * to BSCD2000 m
SWEDEN	SMHI	2586/3308	Hälsjölandet discontinued	65.771667	23.903056	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	40/35140	GÄSÖREN	64.678611	21.249167	0.8	0.82	0.008
SWEDEN	SMHI	2056/33053	BÅTAN	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	Skagssjö discontinued	63.190556	19.012500	-0.4	0.80	-0.004
SWEDEN	SMA	110/35138	SKAGSSJÖEN	63.190556	19.012500	-0.4	0.80	-0.004
SWEDEN	SMA	172/35209	LUNGE	62.860556	17.876889	0.1	0.77	0.001
SWEDEN	SMHI	2062/33074	Draghällan discontinued	62.333333	17.466667	0.7	0.74	0.007
SWEDEN	SMHI	2061/33055	SPKARNA	62.363333	17.531111	0.7	0.74	0.007
SWEDEN	SMA	66/35127	LAUSNE ÖRSKÄRSKALEN	61.206944	17.145556	3.5	0.64	0.035
SWEDEN	SMA	33/35119	BÖNAN	60.738611	17.318611	5.0	0.58	0.050
SWEDEN	SMA		GÄVLE	60.606666	17.230972	5.0	0.58	0.050
SWEDEN	SMHI	2067/33075	Björn discontinued	60.633333	17.966667	5.6	0.56	0.056
SWEDEN	SMHI	2179/33056	FORSÅR	60.408611	18.210833	6.3	0.53	0.063
SWEDEN	SMA	67/35154	LOUDDEN	59.341389	18.137222	8.4	0.38	0.084
SWEDEN	SMHI	2069/33057	STOCKHOLM	59.324167	18.081884	8.5	0.38	0.085
SWEDEN	SMA	175/35112	NYNÄS FISKEHAMN	58.917500	17.972222	8.1	0.31	0.081
SWEDEN	SMHI	2507/33058	LANDSÖRT NORRA	58.768889	17.588889	8.3	0.29	0.083
SWEDEN	SMHI	2073/33076	Landort discontinued	58.750000	17.866667	8.3	0.29	0.083
SWEDEN	SMA	34/35185	E4 BRON SÖDERTÄLJE	59.184722	17.642778	8.2	0.33	0.082
SWEDEN	SMA	107/35118	ÖVELLUND VINTERKÄSEN	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	2545/33085	ARKÖ	58.484167	16.960556	9.8	0.25	0.098
SWEDEN	SMA	93/35151	VÄSTERVIK	57.748333	16.675278	11.0	0.16	0.110
SWEDEN	SMA	81/35114	SJÖTTE	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	SIMPEVÄRP	57.410278	16.675833	11.7	0.12	0.117
SWEDEN	SMHI	2083/33061	ÖLANDS NORRA UDDE	57.366111	17.097222	11.6	0.12	0.116
SWEDEN	SMHI	2085/33062	ÖSARSHAMN	57.275000	16.478611	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	KUNGSBOLMSFÖRT	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	2320/33064	SÄRÖSHAMN	55.557500	14.357778	16.0	-0.08	0.160
SWEDEN	SMHI	2093/33078	Västad discontinued	55.426944	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 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 NN₅₅ 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](#).

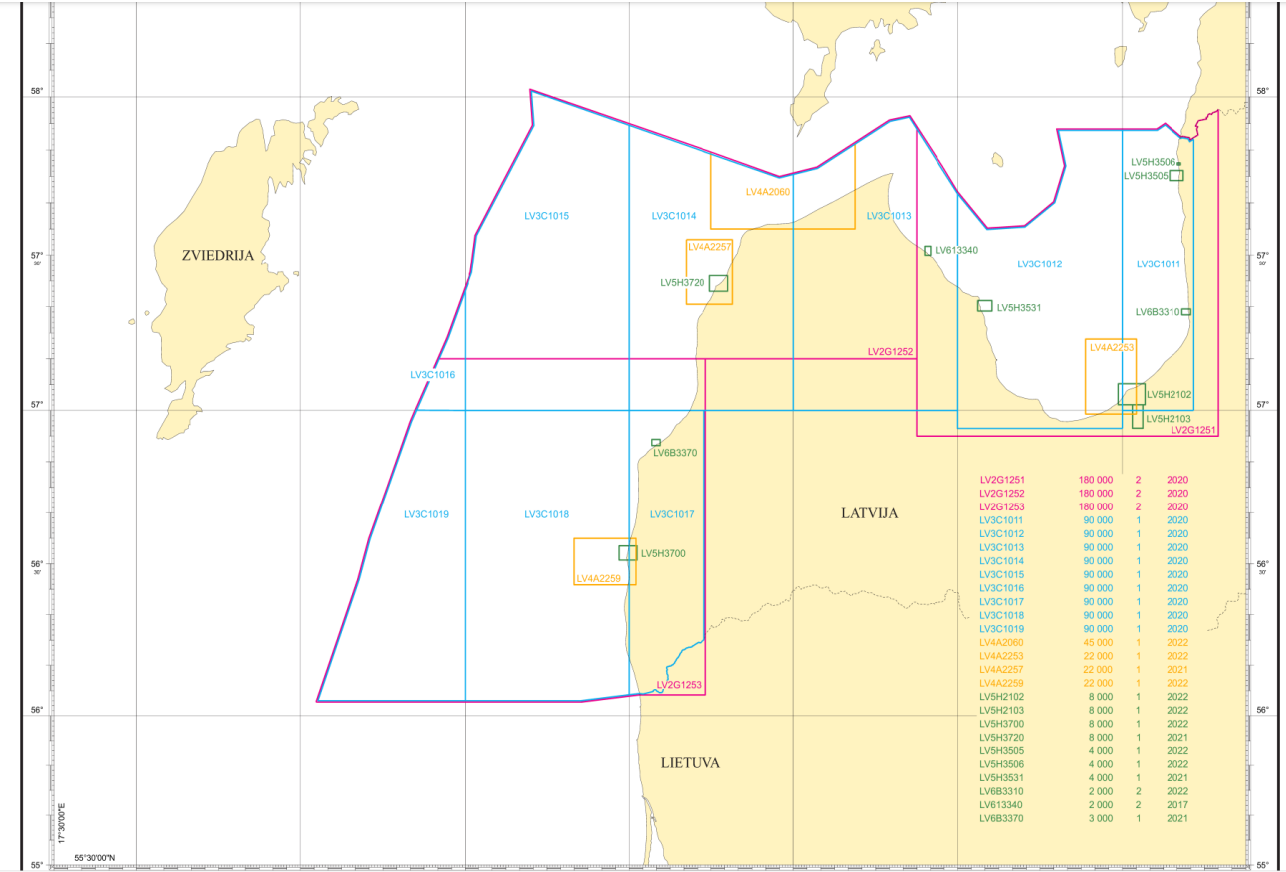
Finland - implementation status BSCD2000

Production schedule of BSCD2000 (N2000) nautical charts:



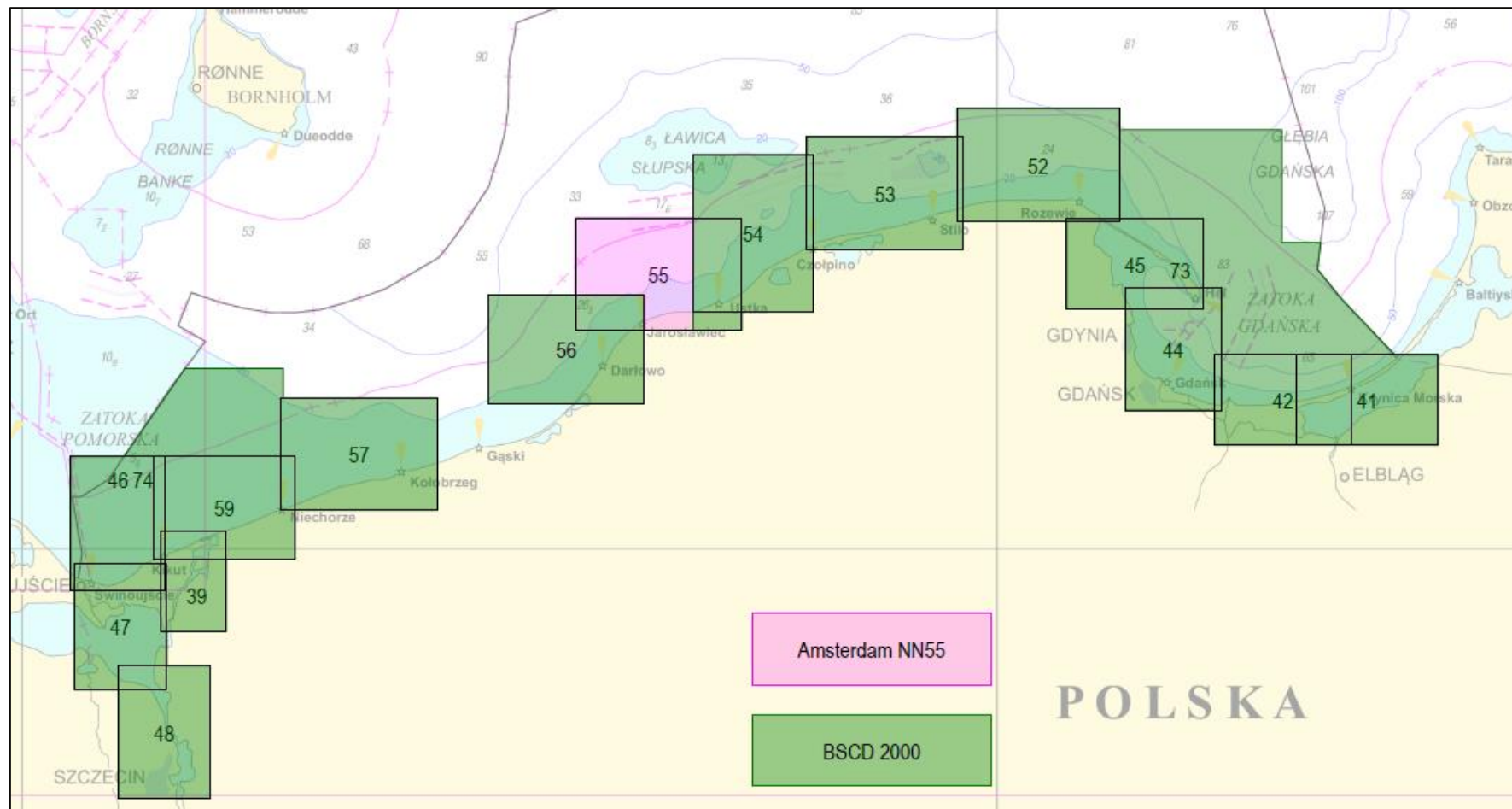
Latvia - implementation status BSCD2000

ENC from Latvia:



Poland - implementation status BSCD2000

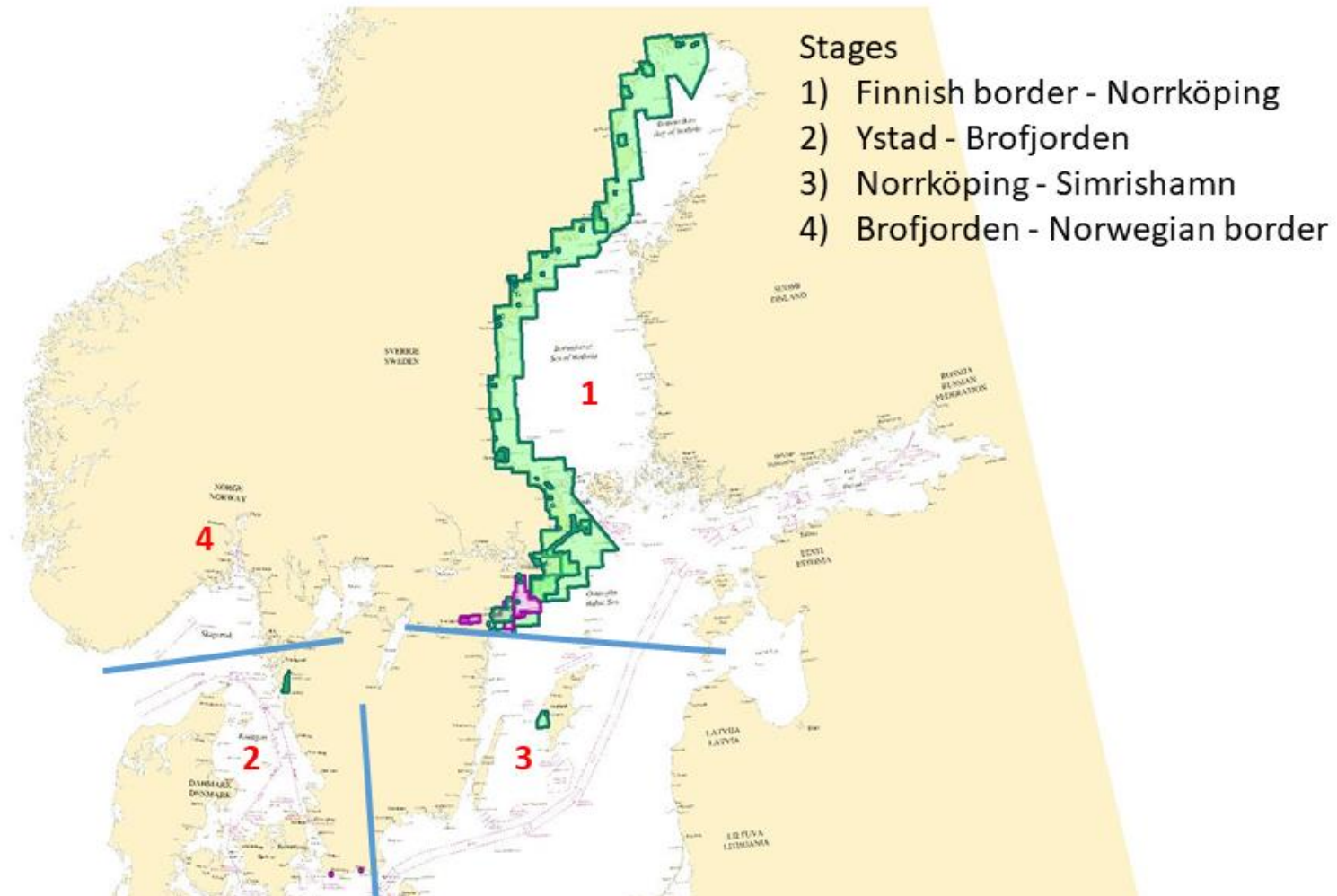
Implementation schedule (approach band only):



PL nautical charts are referred to Amsterdam NN₅₅. New editions of harbour, approach and coastal charts are issued in PL-EVRF2007-NH (BSCD2000) reference system. March 2024.

Sweden – implementation status BSCD2000

Chart Improvement Project (status 2024-03-19)



Implementation status Baltic Sea 2024

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

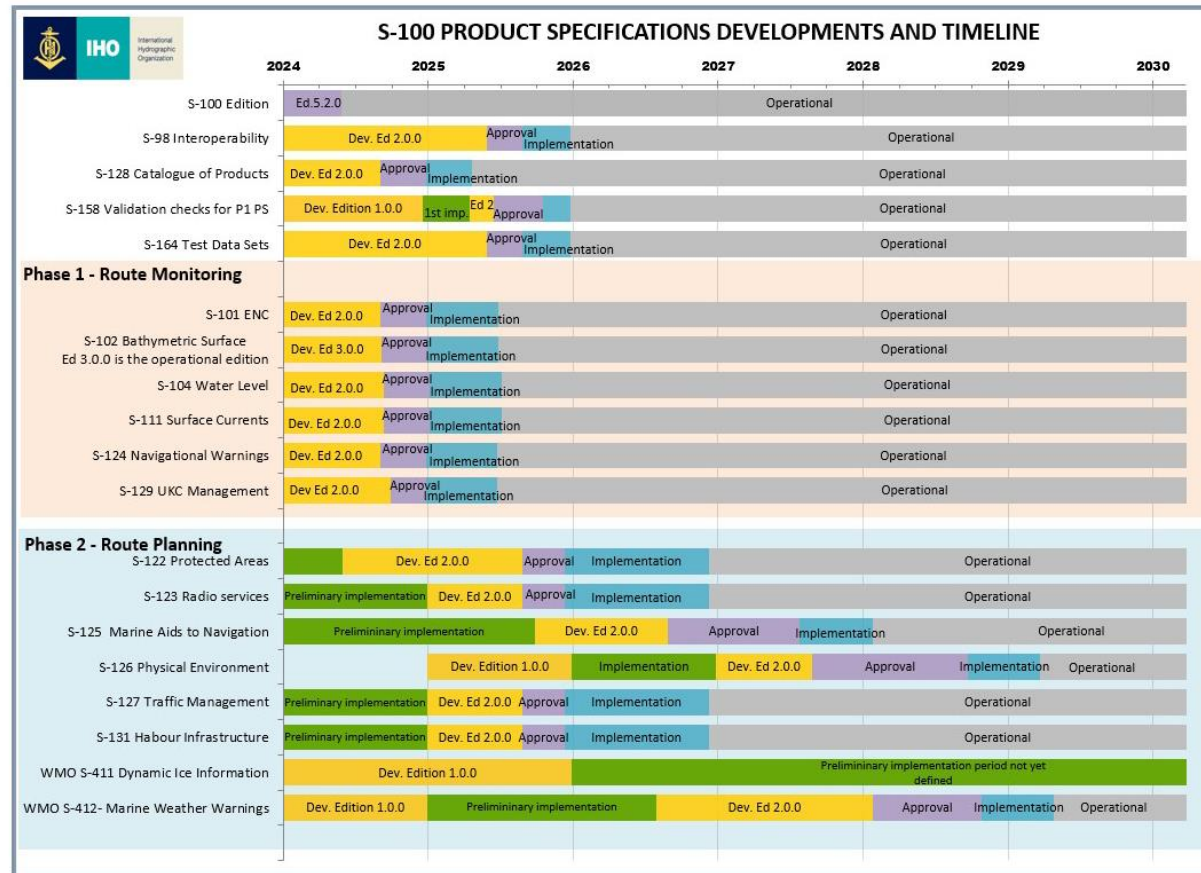
Country	Status BSCD2000 for charts	Status BSCD2000 for water level (see mwreg_boos)	Status S-104/S-111
Denmark	Chart datum in practice close to EVRS-based chart datum (DVR90). BSCD2000 is implemented in ENC and will be implemented in paper charts in the order of reprinting.	All Danish water level stations are connected to DVR90 (BSCD2000). Data distributed to BOOS/CMEMS in relation to DVR90. 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. Aim to have a plan for S-104 and S-111 in 2024. DGA and DMI coordinates the work.
Estonia	All decisions are taken and the implementation is ongoing. Official use in charts and water level information from 2018-01-01. Notices to Mariners 2022-12-01, Info Sheet . Web application Nutimeri displays Estonian Transport Administration's official electronic navigational charts.	All Estonian water level stations are connected to EH2000 (BSCD2000). Data distributed to BOOS/CMEMS in relation to BHS77 (old system). 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.
Finland	Ongoing. All decisions are taken already in 2008 and 2015. Approach charts from Tornio to Vaasa have been published. The publication status of N2000 charts and Finnish nautical charts portfolio . New video 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 Table . Water level observations and forecasts will be available in N2000 for the public simultaneously with Traficom nautical charts. Data distributed to BOOS/CMEMS in relation to MSL. 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.
Germany	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 chart datum for German waters in the Baltic Sea . 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). Data distributed to BOOS/CMEMS in relation to DHHN2016, but metadata refers to SNN76/Kronstadt (old system). Responsibility of Federal Waterways and Shipping Administration (WSV).	BSH is responsible for water level and current information. BSH coordinates the work.
Latvia	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 BAS-77 and LAS-2000,5 is well known and shown in chart notes.	All water level stations is connected to LAS-2000,5 (BSCD2000). Data distributed to BOOS/CMEMS in relation to LAS-2000,5. 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.
Lithuania	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). Data distributed to BOOS/CMEMS in relation to BHS-77 (old system). 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.
Poland	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). Data distributed to BOOS/CMEMS in relation to Amsterdam NN55, but metadata refers to BHS77. 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.
Sweden	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. Notices to Mariners 2019-05-15 . 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 Table . Data distributed to BOOS/CMEMS in relation to BSCD2000. 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. SMA coordinates the work.

2024-03-26

S-100 Implementation

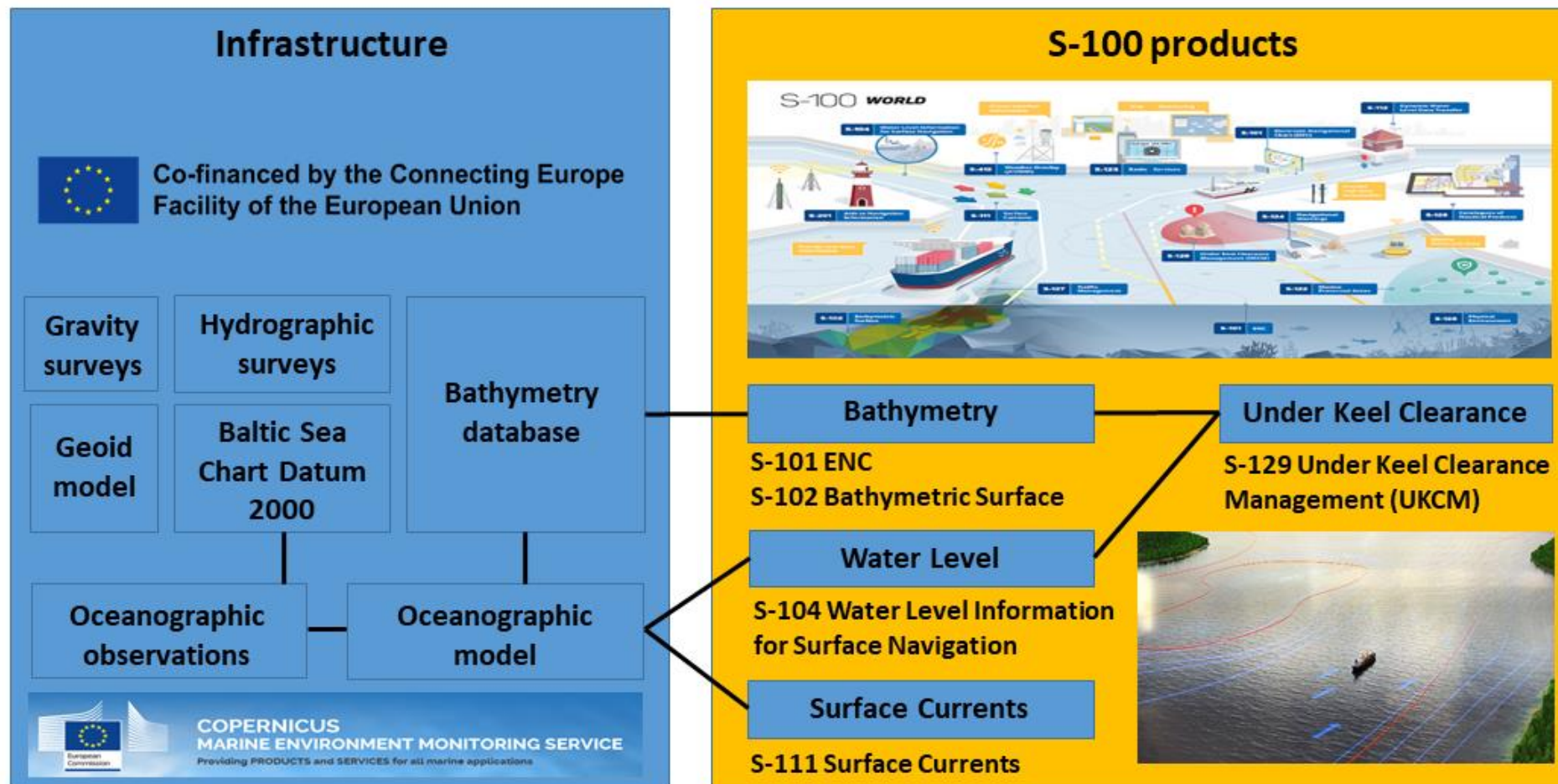
IHO S-100 Implementation Strategy

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



This S-100 timeline is updated: 02 07 2024

Real Time Hydrographic and Environmental Information Service



Thanks!



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