



**BALTIC SEA
HYDROGRAPHIC
COMMISSION**



BSHC29_C3_CDWCWG_Presentation-SE

29th BSHC Meeting
17-19 September 2024
Tallinn

Thomas Hammarklint



Objectives

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



1. Status of CDWCWG work: Meetings / Implementation status

[BSHC29 C3 SE CDWCWG Report](#)

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

The new name of the working were approved at the last BSHC Conference ([BSHC28](#)): Chart Datum, Water level and Currents Working Group ([CDWCWG](#)). The last meeting ([CDWCWG1 Chair's Report](#), [Minutes](#)) was held 26-27 March 2023 in Helsinki, Finland. [16 delegates](#) attended the meeting. The main objectives of the CDWCWG 1st meeting was to review the [National implementation status](#) and coordination of the [Baltic Sea Chart Datum 2000](#), S-104 Water Level and S-111 Surface Currents in the Baltic Sea ([CDWCWG Roadmap](#)), follow up the [List of Actions](#) from the last meeting, [TORs](#), [Work Programme](#) and coordinate our work.

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

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

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

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

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

- BSHC CDWG14, 28-29 March 2023, Göteborg, Sweden
- BOOS Annual meeting, 9-11 May 2023, Helsinki, Finland
- BSHC28, 19-21 September 2023, Helsinki, Finland
- BSHC CDWCWG1, 26-27 March 2024, Helsinki, Finland
- BOOS, 6-8 May 2024, Copenhagen, Denmark
- TWCWG9, 19-22 November 2024, Monaco
- Kartdagarna, 8-10 April 2025, Skellefteå, Sweden
- NSHC TWG25, 7 February 2023, VTC
- EUREF Symposium, 23-26 May 2023, Göteborg, Sweden
- TWCWG8, 20-22 February 2024, VTC
- Kartdagarna, 16-18 April 2024, Göteborg, Sweden
- BSHC29, 17-19 September 2024, Tallinn, Estonia
- BSHC CDWCWG2, 25-26 March 2025, Tallinn, Estonia

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



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

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

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

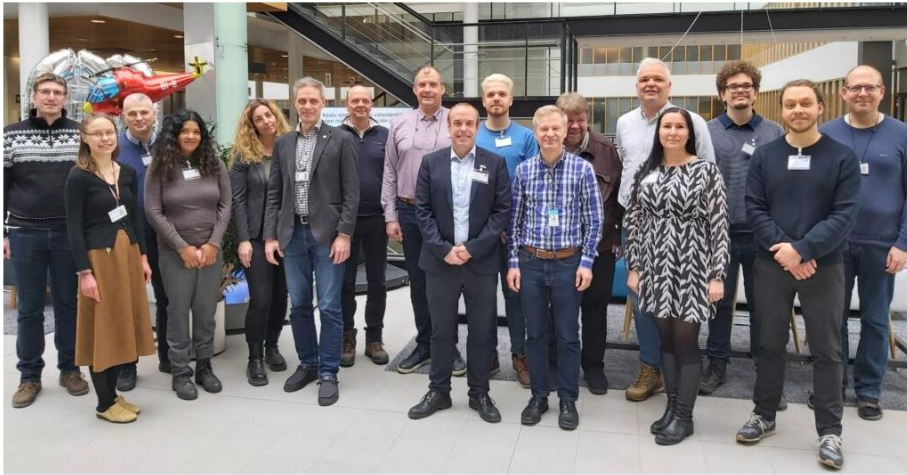


Photo: Chart Datum, Water level and Currents Working Group 1st meeting, 26-27 March 2024, Helsinki, Finland

<https://www.bshc.pro/working-groups/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
Sweden	Mr Thomas Hammarklint (Chair)
Sweden	Mr Lars Jakobsson
Sweden	Mr Henrik Tengbert

Observers and Experts:

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

Implementation status Baltic Sea 2024

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

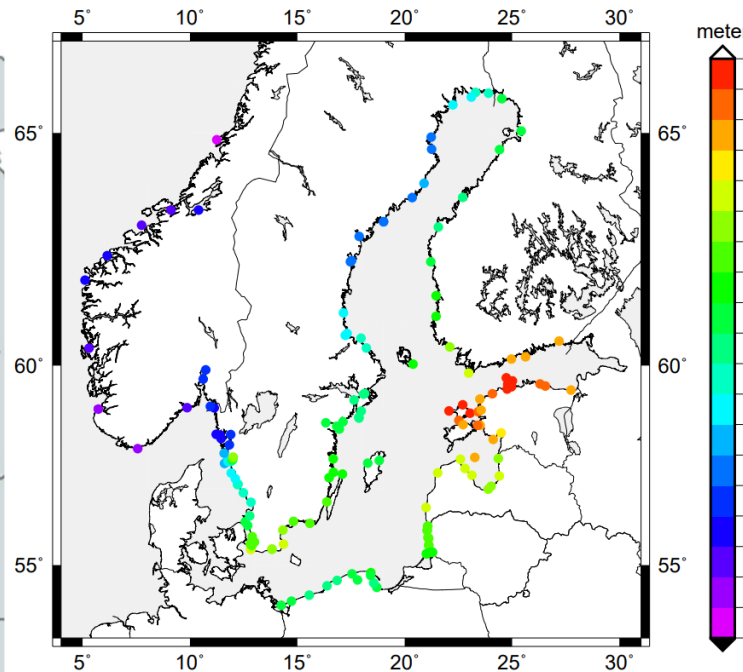
Country	Status BSCD2000 for charts	Status BSCD2000 for water level (see mwreg_boos)	Status S-104/S-111
Denmark	Chart datum in practice close to EVRS-based chart datum (DVR90). BSCD2000 is implemented in ENC and will be implemented in paper charts in the order of reprinting.	All Danish water level stations 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 (Forsvaret Center for Operativ Oceanografi) is responsible for water level and current information. Aim to have a plan for S-104 and S-111 in 2024. 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 refer 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 Klaipeda 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 is 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 2019-06-08. 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



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	Apparent (relative) landuplift	Correction* to BSCD2000
						cm	cm/year	in
SWEDEN	SMHI	2388/33088	Hegareden discontinued	65.771667	23.303206	5.9	0.72	0.059
SWEDEN	SMA	58735503	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	FURUÖRUND	64.915833	21.230556	0.5	0.82	0.005
SWEDEN	SMA	402/35340	GÄSÖREN	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	57735124	HOLMSUND	63.695833	20.347222	1.4	0.80	0.014
SWEDEN	SMHI	2323/33054	Sägsjöde discontinued	63.190556	19.012500	-0.4	0.80	-0.004
SWEDEN	SMA	130/35138	SKAGSÖDE2	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	Draghällan 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	66735127	LJUSNE ÖBRSKÄRSKAIEN	61.208944	17.145556	3.5	0.64	0.035
SWEDEN	SMA	33735119	BÖNAN	60.738611	17.318611	5.0	0.58	0.050
SWEDEN	SMA		GÄVLE	60.696665	17.330922	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	FORSÅMARK	60.408611	18.210833	6.3	0.53	0.063
SWEDEN	SMA	67735154	LÖUDEN	59.343389	18.137222	8.4	0.38	0.084
SWEDEN	SMHI	2069/33057	STOCKHOLM	59.324167	18.081844	8.5	0.38	0.085
SWEDEN	SMA	173/35112	NYNÄS FISKEHAMN	58.915700	17.972222	8.1	0.31	0.081
SWEDEN	SMHI	2507/33058	LANDSORT NORRA	58.768889	17.858889	8.3	0.29	0.083
SWEDEN	SMHI	2073/33076	Landort discontinued	58.750000	17.866667	8.3	0.29	0.083
SWEDEN	SMA	34735185	F4 BRÖN SÖDERTÄLJE	58.184722	17.642778	8.2	0.33	0.082
SWEDEN	SMA	102/35118	ÖREGLÖND-VINTERHÄSEN	58.661667	17.124722	9.3	0.26	0.093
SWEDEN	SMA	58735101	JÜTEN	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	ARKÖ	58.484167	16.960556	9.8	0.25	0.098
SWEDEN	SMA	63735151	VÄSTERVIK	57.748333	16.675278	11.0	0.16	0.110
SWEDEN	SMA	81735114	SLITE	57.705633	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	77735200	SIMPEVARP	57.430278	16.675833	11.7	0.12	0.117
SWEDEN	SMHI	2083/33061	ÖLANDS NORRA UDDE	57.346811	17.097222	11.6	0.12	0.116
SWEDEN	SMHI	2081/33062	ÖSKARSHAMN	57.279500	16.478656	12.0	0.10	0.120
SWEDEN	SMA	60735105	KALMAR	56.658889	16.378333	12.5	0.06	0.125
SWEDEN	SMHI	2088/33063	KUNGSÖLMSFORT	56.105278	15.589444	13.3	0.01	0.133
SWEDEN	SMA	61735131	KARLSHAMN	56.154167	14.821389	13.8	-0.01	0.138
SWEDEN	SMHI	2543/33083	Åhus discontinued	55.528333	14.328611	15.1	-0.05	0.151
SWEDEN	SMHI	2320/33064	SMÖRSHAMN	55.557950	14.357778	16.0	-0.08	0.160
SWEDEN	SMHI	2091/33078	Vistad discontinued	55.426944	13.825833	15.8	-0.07	0.158
SWEDEN	SMA	94735159	VSTAD2	55.422778	13.825556	15.8	-0.07	0.158

Reference levels used in the Baltic Sea, Marine Copernicus and EMODNET Data Portals and differences with respect to the Baltic Sea Chart Datum 2000 (BSCD2000). In Sweden and Finland, the old reference levels are equal to Mean Sea Level (MSL) transferred to year 2023 (according to different national conventions). The values from Norway shows the MSL over the period 1996-2014, relative BSCD2000. In Estonia, Latvia and Lithuania, the Kronstadt reference level is used as old chart datum. In Poland, the local Polish Height System Amsterdam 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](#).



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^{national realization name})

or

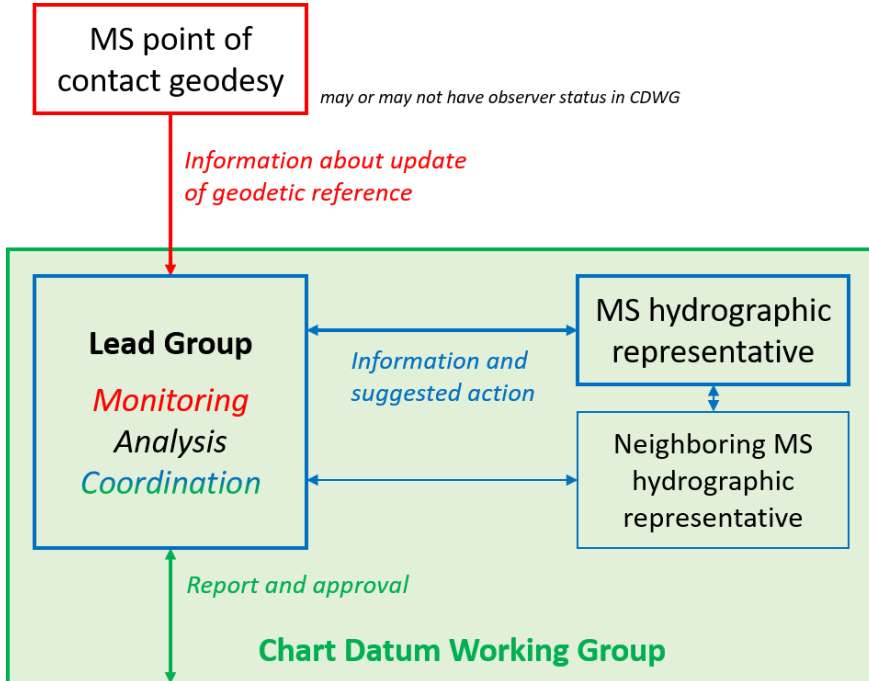
Mean Sea Level (Baltic Sea Chart Datum 2000)

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



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.



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. Ågren², G. Lebesch³, P. Westfeld⁴, T. Hammankint⁵, J. Mononen⁶ and O. B. Andersen⁶

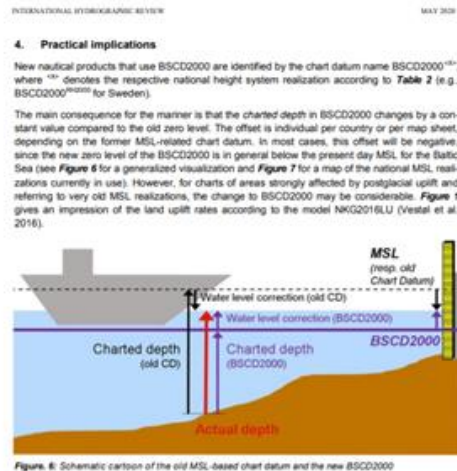
1. Federal Agency for Cartography and Geodesy (Germany)
2. University of Gävle (Sweden) and Lantmäteriet, the Swedish mapping, cadastral and land registration authority (Sweden)
3. Federal Maritime and Hydrographic Agency (Germany)
4. Swedish Maritime Administration (Sweden)
5. Finnish Transport Agency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

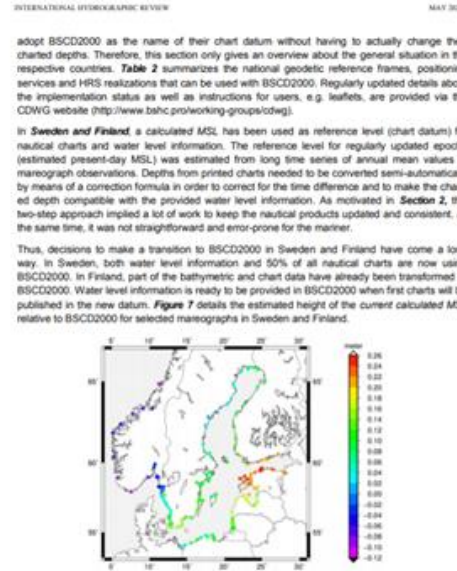
Résumé

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 Normal Amsterdam 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.



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



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 and www.smhi.se

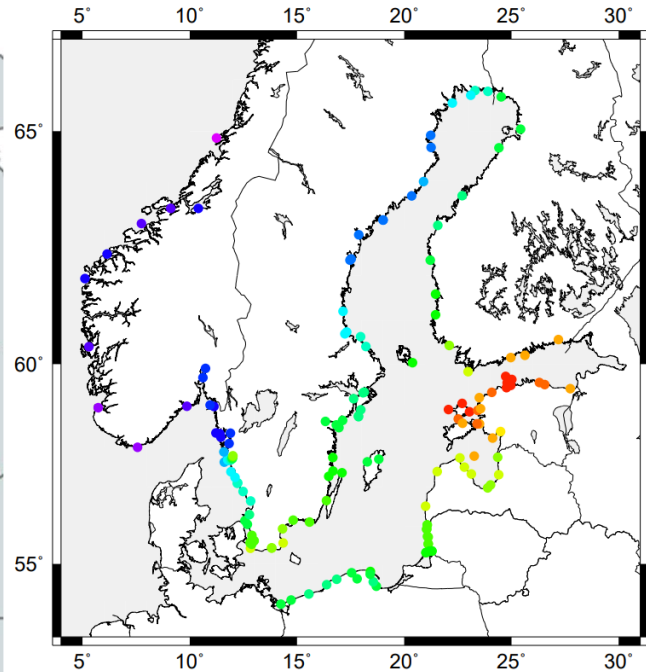
www.sjofartsverket.se/RH2000 www.smhi.se

SMHI och Sjöfartsverket. Publ. 15 May 2019

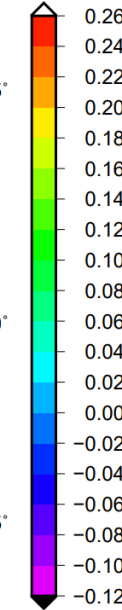


Reference levels in the Baltic Sea

Reference levels Baltic Sea
Water level information



meter



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 (NAAP)
RIS2000 = Swedish Height System 2000, heights referred to Amsterdam (NAAP)
* = Correction of provided sea level data to BSCD2000 in the Baltic Sea Chart Datum 2000 (BSCD2000)

COUNTRY	OWNER	NR	STATION NAME	LATITUDE	LONGITUDE	BSCD2000 cm	Apparent (relative) land-splitt cm/year	Correction * to BSCD2000 m
SWEDEN	SMH	2582/3088	Haparanda discontinued	62.771667	21.903056	5.9	0.72	0.059
SWEDEN	SMA	58/35103	KALIX KARLSBORG	65.788889	23.303333	6.1	0.72	0.061
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SWEDEN	SMA	57/35124	HOLMÅSUND	63.695833	20.347222	1.4	0.80	0.014
SWEDEN	SMH	232/3054	Skagvulle discontinued	63.190556	19.012500	-0.4	0.80	-0.004
SWEDEN	SMA	110/35138	SKAGSÖDEZ	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	SMH	2062/3074	Dragsållen discontinued	62.333333	17.466667	0.7	0.74	0.007
SWEDEN	SMH	2061/3055	SPIKÄRNA	62.363333	17.511111	0.7	0.74	0.007
SWEDEN	SMA	66/35127	LÖVSTEN ÖRSKÄRKAJEN	61.209044	17.145056	3.5	0.64	0.035
SWEDEN	SMA	33/35119	BONÅS	60.738611	17.318611	5.0	0.58	0.050
SWEDEN	SMA		GÄVLÉ	60.696565	17.230972	5.0	0.58	0.050
SWEDEN	SMH	2067/3075	Björn discontinued	60.633333	17.966667	5.6	0.56	0.056
SWEDEN	SMH	2179/3056	FORSMARK	60.408611	18.210833	6.3	0.51	0.063
SWEDEN	SMA	67/35154	LÖVSTEN	59.341389	18.137222	8.4	0.38	0.084
SWEDEN	SMH	2069/3057	STOCKHOLM	59.324167	18.081944	8.5	0.38	0.085
SWEDEN	SMA	173/35112	NYNÄS FISKEHAMN	58.917500	17.972222	8.1	0.31	0.081
SWEDEN	SMH	2507/3058	LANDSÖRT NORRA	58.768889	17.858889	8.3	0.29	0.083
SWEDEN	SMH	2073/3076	Landort discontinued	58.750000	17.866667	8.3	0.29	0.083
SWEDEN	SMA	34/35185	E4 BRÖN SÖCKERTÄLJE	58.184722	17.642778	8.2	0.33	0.082
SWEDEN	SMA	30/35118	ÖMELÖSUND VINTERKLASEN	58.665167	17.124722	9.3	0.26	0.093
SWEDEN	SMA	58/35101	JUTEN	58.634167	16.324722	9.8	0.25	0.098
SWEDEN	SMH	2076/3059	Marviken discontinued	58.553611	16.837222	9.8	0.25	0.098
SWEDEN	SMH	2545/3085	ÅRMO	58.484167	16.960556	9.8	0.25	0.098
SWEDEN	SMA	91/35151	VÄSTERVIK	57.748333	16.675278	11.0	0.14	0.110
SWEDEN	SMA	81/35114	SLETTE	57.705833	18.810000	9.0	0.12	0.090
SWEDEN	SMH	2080/3060	VISBY	57.639167	18.284444	9.0	0.12	0.090
SWEDEN	SKR	77/35200	SIMPVARP	57.415278	16.675833	11.7	0.12	0.117
SWEDEN	SMH	2083/3062	ÖLANDS NORRA UDDE	57.366111	17.097222	11.4	0.12	0.114
SWEDEN	SMH	2085/3062	ÖSKARSHAMN	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	SMH	2088/3063	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	SMH	2141/3083	Åhus discontinued	55.928333	14.328611	15.1	-0.05	0.151
SWEDEN	SMH	2320/3064	SÄMRSHAMN	55.557500	14.357778	16.0	-0.08	0.160
SWEDEN	SMH	2091/3078	Ystad discontinued	55.426944	13.825833	15.8	-0.07	0.158
SWEDEN	SMA	94/35159	YSTAD2	55.422778	13.825556	15.8	-0.07	0.158

Reference levels used in the Baltic Sea, Marine Copernicus and EMODNET Data Portals and differences with respect to the Baltic Sea Chart Datum 2000 (BSCD2000). In Sweden and Finland, the old reference levels are equal to Mean Sea Level (MSL) transferred to year 2023 (according to different national conventions). The values from Norway shows the MSL over the period 1996-2014, relative BSCD2000. In Estonia, Latvia and Lithuania, the Kronstadt reference level is used as old chart datum. In Poland, the local Polish Height System Amsterdam 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](#).



2. CDWCWG List of Members

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
Sweden	Mr Thomas Hammarklint (Chair)
Sweden	Mr Lars Jakobsson
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 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	Mrs Małgorzata Pająk
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

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 Working Group should

Report to the BSHC Conferences.

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



4. CDWCWG Work Programme



BSHC Chart Datum, Water level and Currents Working Group

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

Approved by the BSHC 28th Conference, 19-21 September 2023

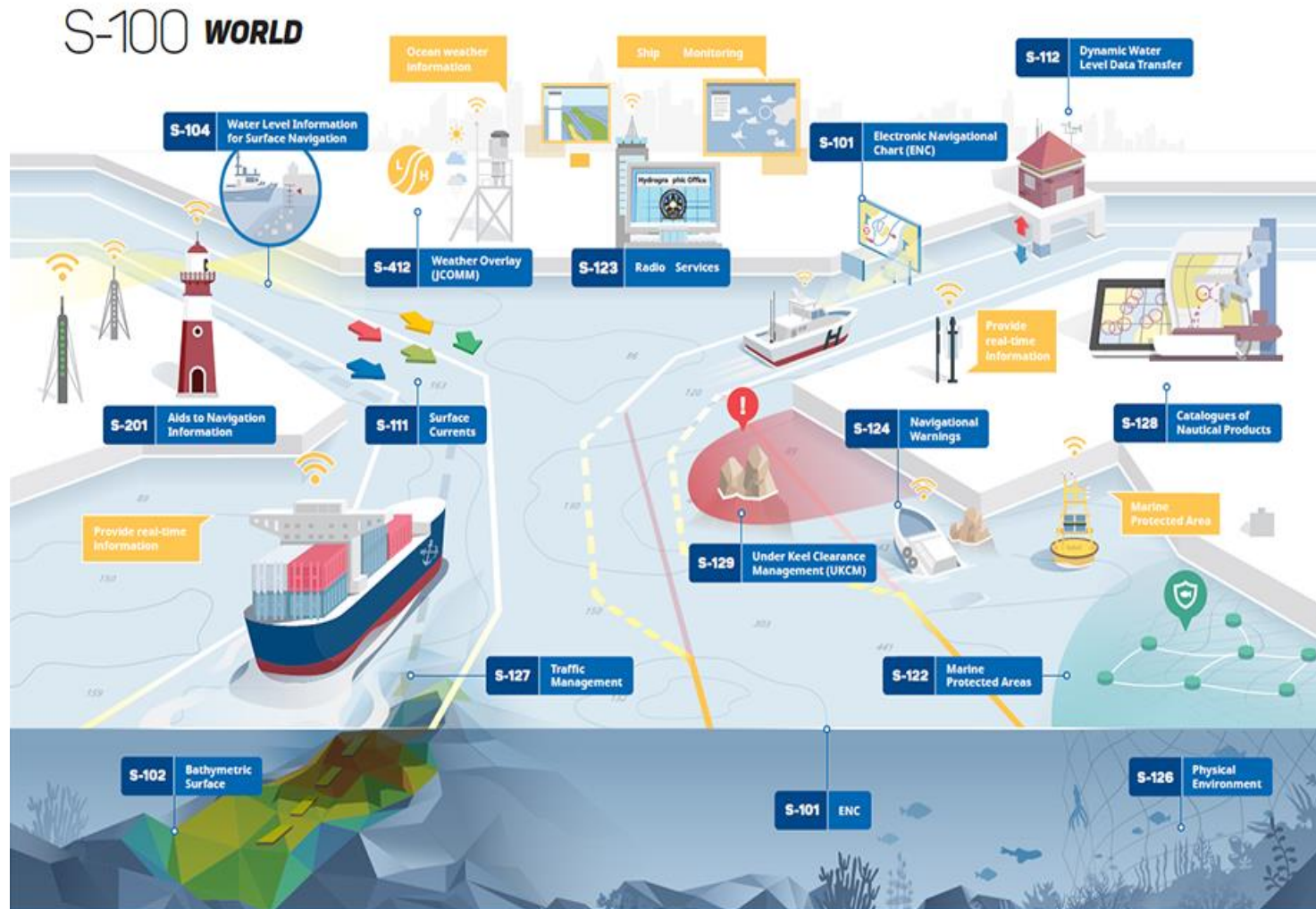
Note: This Work Programme includes those Tasks which were identified as the priority issues and which are expected to be fostered from 2023 and onwards bearing in mind the resources the BSHC members have.

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.

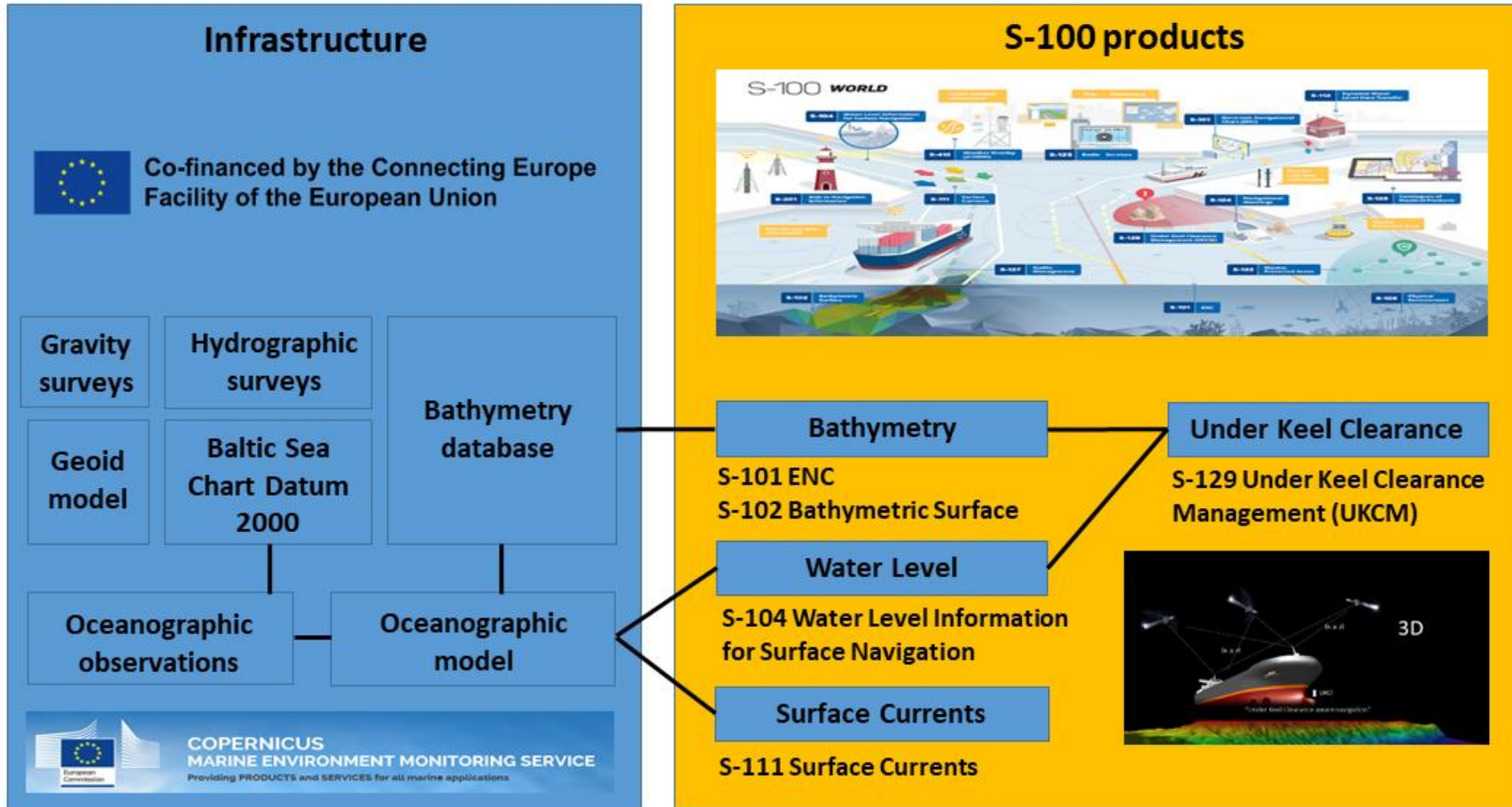


5. Future Maritime Services S-100



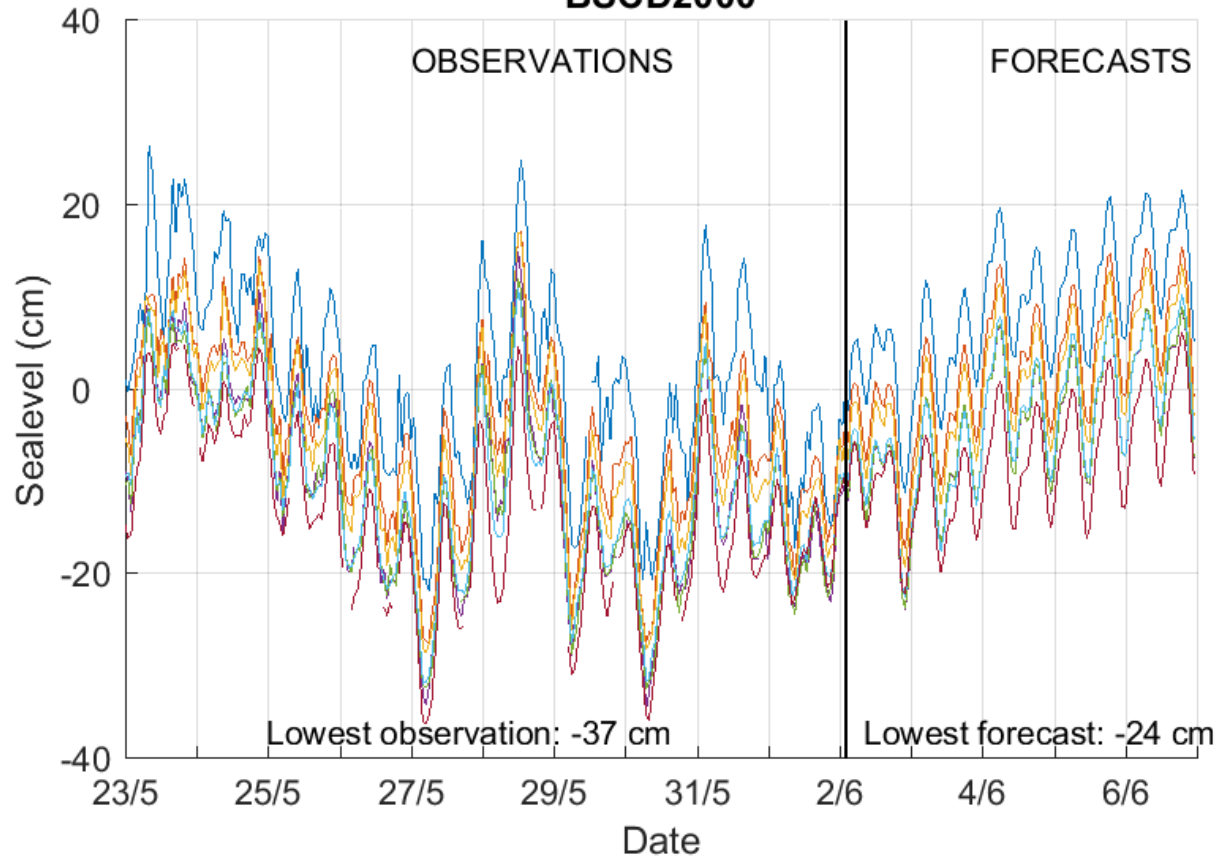
Dynamic S-100 products (S-104, S-111 and S-129)

Real Time Hydrographic and Environmental Information Service

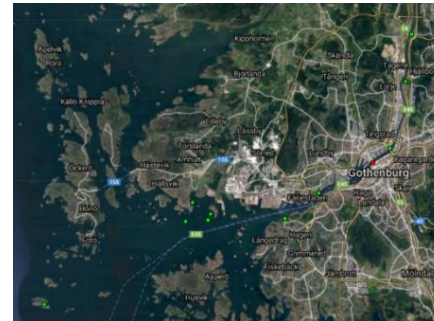


Example of a potential S-104 Water Level product (Port of Göteborg and upstream Göta River)

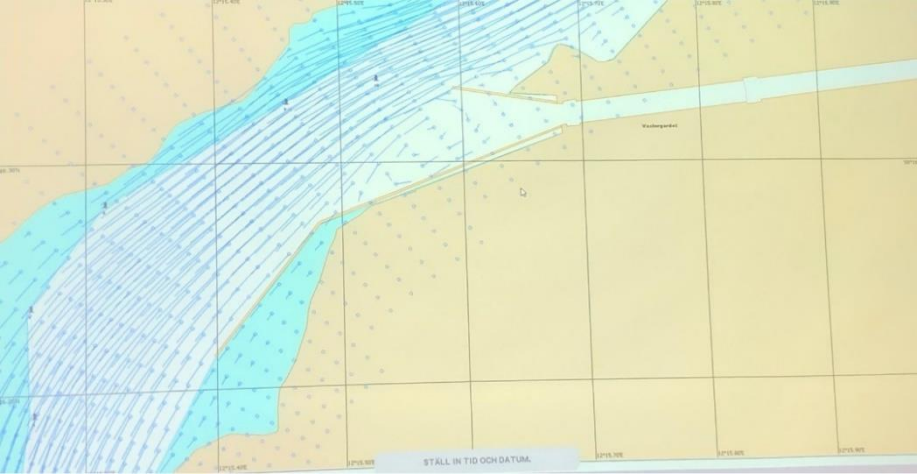
Sealevels Göteborg
2023-05-23 to 2023-06-06
Issued: 2023-06-02 02:00 UTC
BSCD2000



- Agnesberg
- Tingstad
- Hisingsbron
- Eriksberg
- Tångudden
- Krossholmen
- Vinga



Example of a potential S-111 Surface Current product (Trollhättan Locks Area, Göta River)



Future navigation



6. How member states benefits best of CDWCVWG

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



7. Actions requested from BSHC 29th Conference

The BSHC 29th Conference is invited to:

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



Thanks!



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