



**BALTIC SEA  
HYDROGRAPHIC  
COMMISSION**



# Baltic Sea Chart Datum 2000

**BOOS Annual Meeting**

5 November 2020

VTC

Thomas Hammarklint

# Baltic Sea Hydrographic Commission (BSHC)



## BALTIC SEA HYDROGRAPHIC COMMISSION



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### 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 ENC's, 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

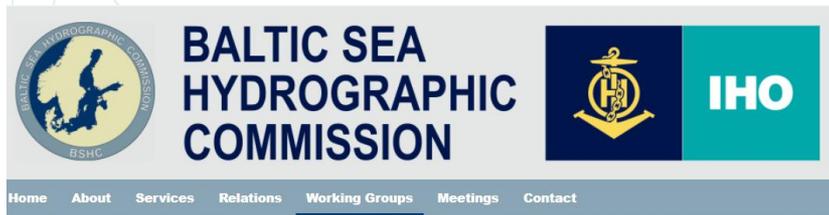
The International Hydrographic Organization is an intergovernmental consultative and technical organization that was established in 1921 to support safety of navigation and the protection of the marine environment. The object of the Organization is to bring about:

- 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

You are here: [Home](#)

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# Chart Datum Working Group (CDWG)



## BSHC Chart Datum Working Group

"To implement a common reference level in the Baltic Sea"



Photo: Chart Datum Working Group 12th meeting, 3-4 March 2020, Gdynia, Poland

The CDWG will have its next meeting (CDWG13)  
7 September 2021 (VTC)

<http://www.bshc.pro/working-groups/cdwg>

### Members of CDWG:

Denmark Mrs Gitte Hauerberg Iversen  
Estonia Mrs Gabriela Kotsulim  
Finland Mr Jarmo Mäkinen  
Germany Dr Patrick Westfeld  
Latvia Mr Bruno Špēls  
Lithuania Mr Mindaugas Zakarauskas  
Poland Mr Witold Stasiak  
Russia Mr Leonid Shalnov  
Russia Dr Sergey V. Reshetniak  
Sweden Mr Thomas Hammarklint (Chair)  
Sweden Mr Lars Jakobsson  
Sweden Mr Henrik Tengbert

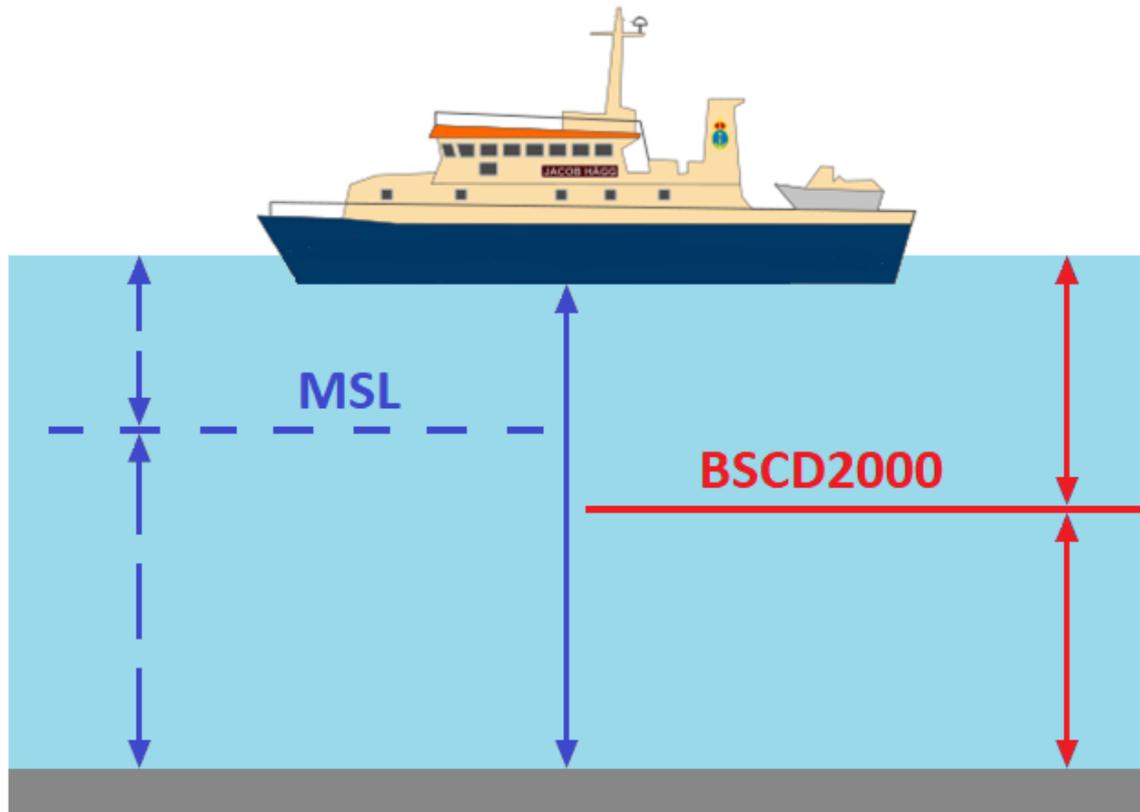
### Observers and Experts:

Estonia Prof. Artu Ellmann  
Estonia Mr Sander Varbla  
Finland Dr Mirjam Bilker-Koivula  
Finland Mrs Anni Montonen  
Germany Dr Gunter Liebsch  
Germany Dr Joachim Schwabe  
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 Mr Mikael Stenström

### Representative of BOOS:

Sweden Mr Thomas Hammarklint

# New reference level



**The water level remains!**

# Baltic Sea Chart Datum 2000 (BSCD2000)

## ➤ Definition:

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

## ➤ Justification:

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

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

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

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

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

or

Mean Sea Level (Baltic Sea Chart Datum 2000)

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

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

SYMBOLS and ABBREVIATIONS: see INT 1

BETECKNINGAR och FÖRKORTNINGAR: se KORT 1

Referensnivå

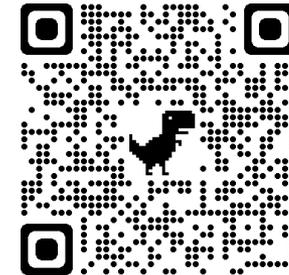


# Baltic Sea Chart Datum 2000 in IHO Registry

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

The screenshot shows the IHO Geospatial Information Registry Data Dictionary Register page. The page title is "Data Dictionary Register". The breadcrumb trail is "Home / GI REGISTERS / Data Dictionary Register". The page displays a summary of the registry with the following counts: Feature Type (366), Information Type (26), Attribute Type (667), Complex Type (92), Enumeration Value (2273), and Codelist Value (117). Below the summary, there are filters for Domain (ALL), Status (Valid), Type (ALL), and Category (Name). The main content area shows the details for the "Baltic Sea Chart Datum 2000" entry, which is an enumerated value. The details include the domain (IHO Hydro), name (Baltic Sea Chart Datum 2000), camel case (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 (Enumerated type), and reference source (Baltic Sea Hydrographic Commission). The page also includes a QR code and a copyright notice: "COPYRIGHT © IHO Geospatial Information Registry. ALL RIGHTS RESERVED. KHOA Acknowledgements".

[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				



# Swedish Chart Improvement project



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

Referensnivå



# Status transition to BSCD2000 in nautical charts



Updated 2020-10-20



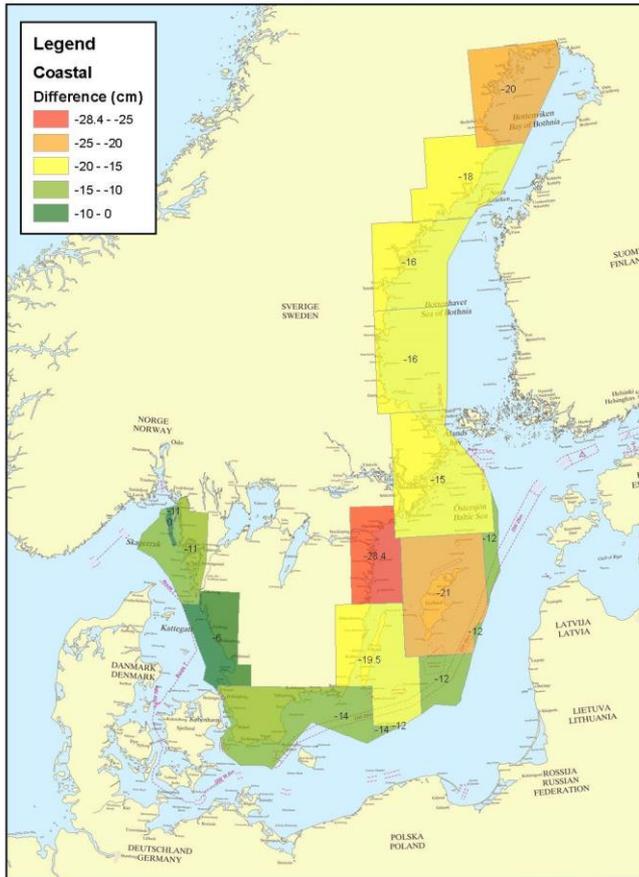
# Difference between present chart datum and BSCD2000

Annex 1 To Questionare, BSHC CDWG

Page 2 (4)

## Difference between existing chart datum and RH 2000 - Coastal

Swedish Maritime Administration, Hydrographic Office, May 16, 2013

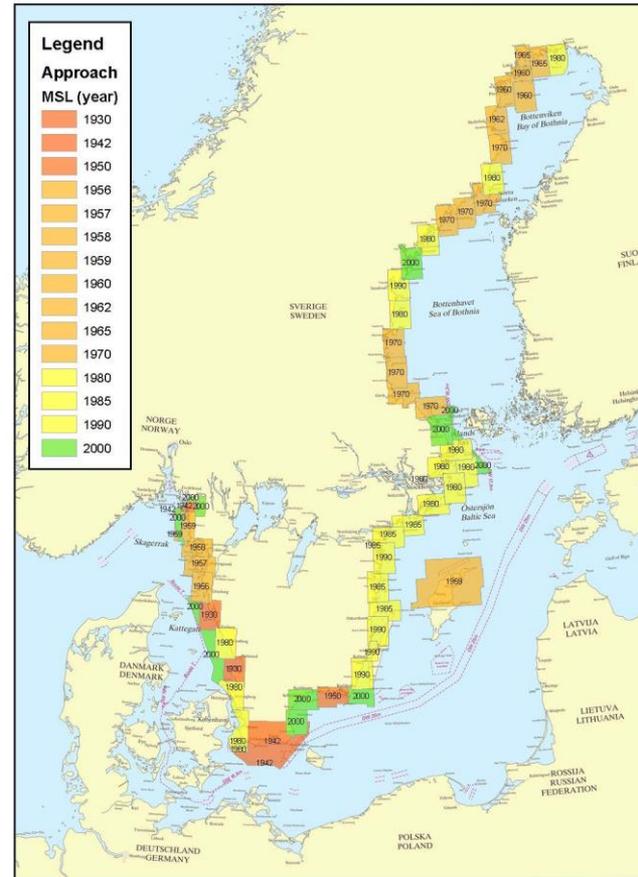


Annex 1 To Questionare, BSHC CDWG

Page 3 (4)

## Year of MSL in Swedish chart database - Approach (Swedish water)

Swedish Maritime Administration, Hydrographic Office, May 16, 2013





# Swedish Sea Level Network



- Real-time data relative BSCD2000 from 60 stations
- 1-minute values with 1 cm accuracy
- Real-time and delayed mode quality control



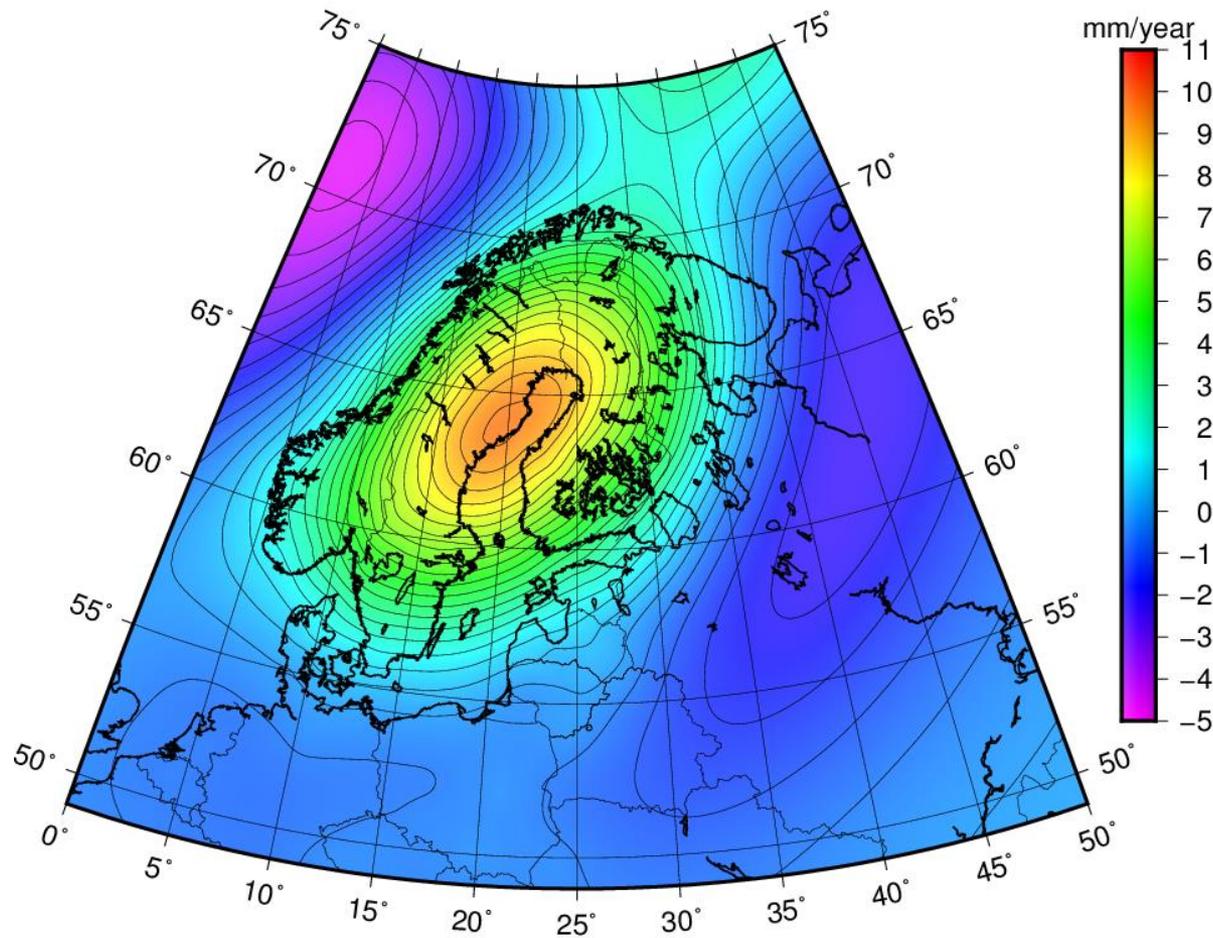
- Class I Upgrade with battery backup
- Class II Upgrade without battery backup
- Class III Unchanged, temporary

- 27 stations (23 SMHI, 3 SMA, 1 CTH)
- 25 stations (21 SMA, 3 GBG, 1 SKB)
- 7 stations (6 SMA, 1 SMHI)

Present water level information are shown in Wind- and Water Information ([ViVa](#))



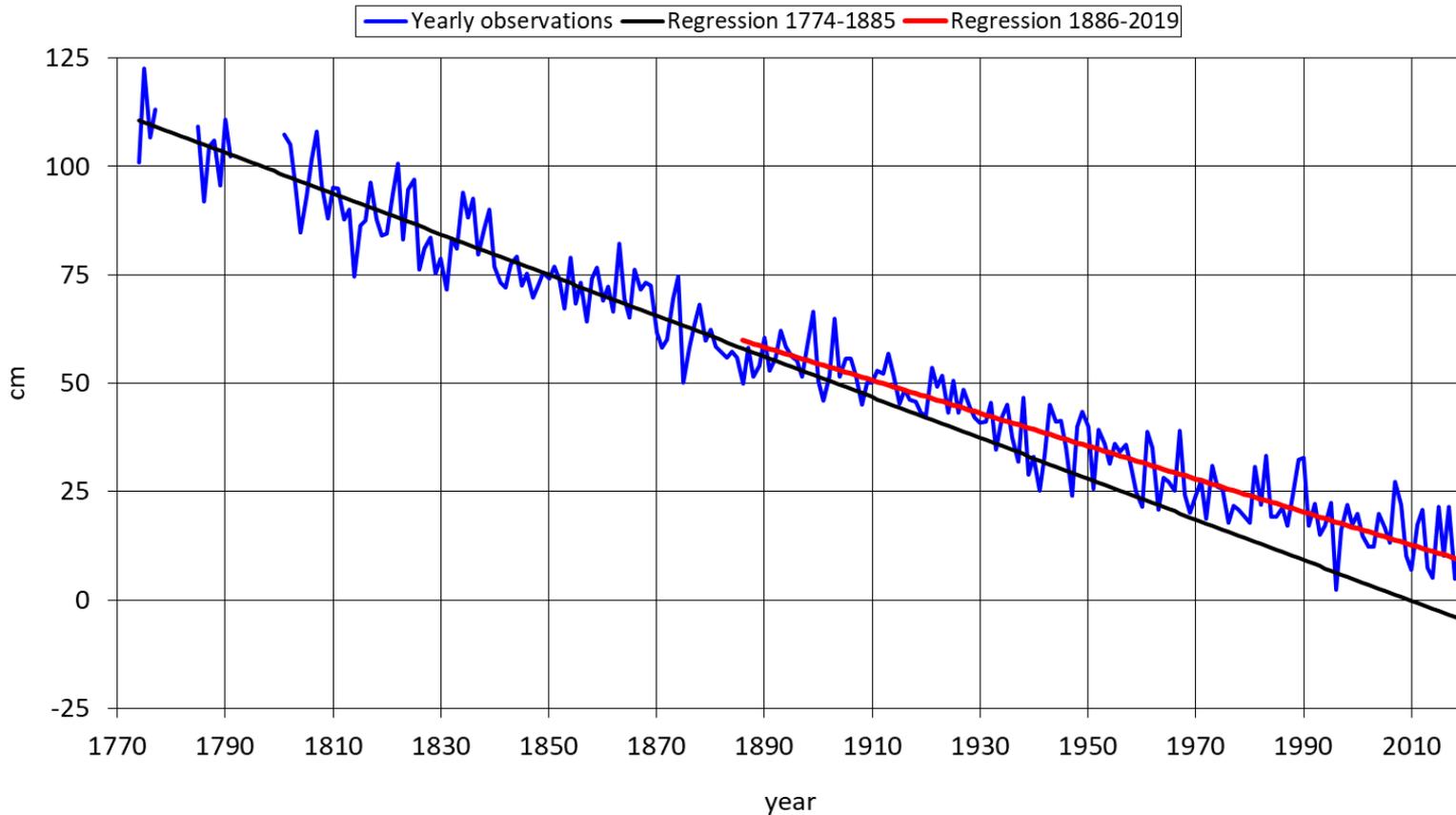
# The land-uplift lowers the mean sea level



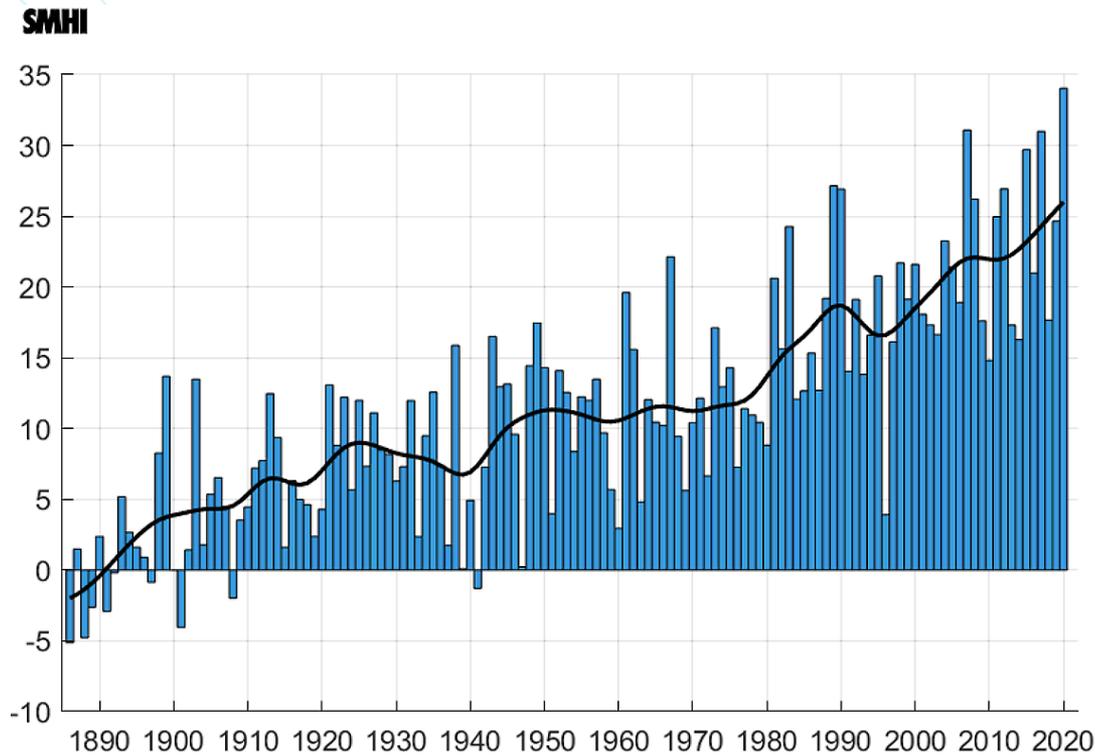
# Stockholm

## “World’s longest sealevel record”

### Sealevel Stockholm 1774 - 2019



# The sea level rise raises the mean sea level

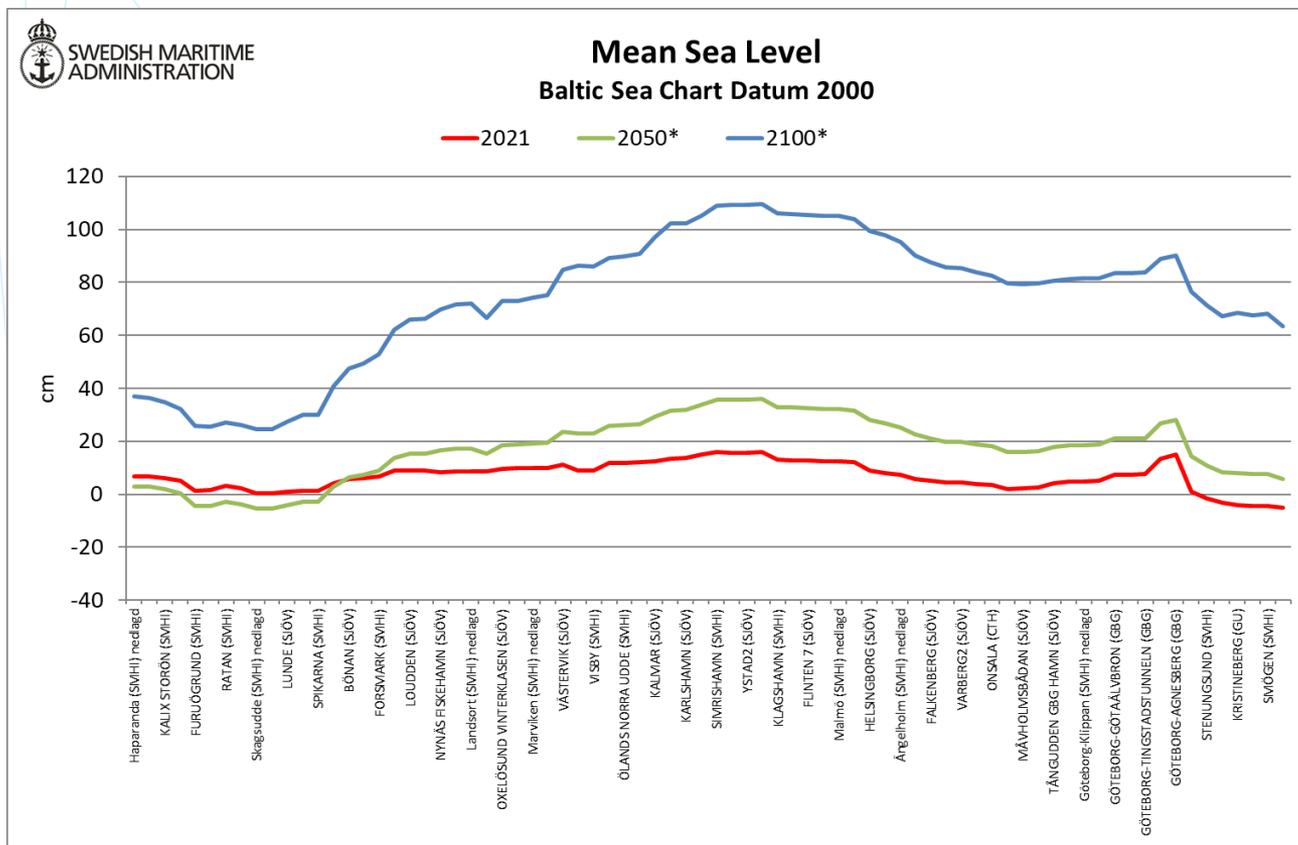


Analysis of 14 Swedish sealevel records since 1886

Sealevel corrected for the levelled land-uplift (glacial isostatic adjustment)



# Changing mean sea level



Calculated mean sea level for the years 2021, 2050 and 2100. \* including a predicted sea level rise, +1 m over the years 2020-2100 and correction for the leveled land-uplift.

[Mean sea level relative BSCD2000](#)



# Difference between old reference system and BSCD2000

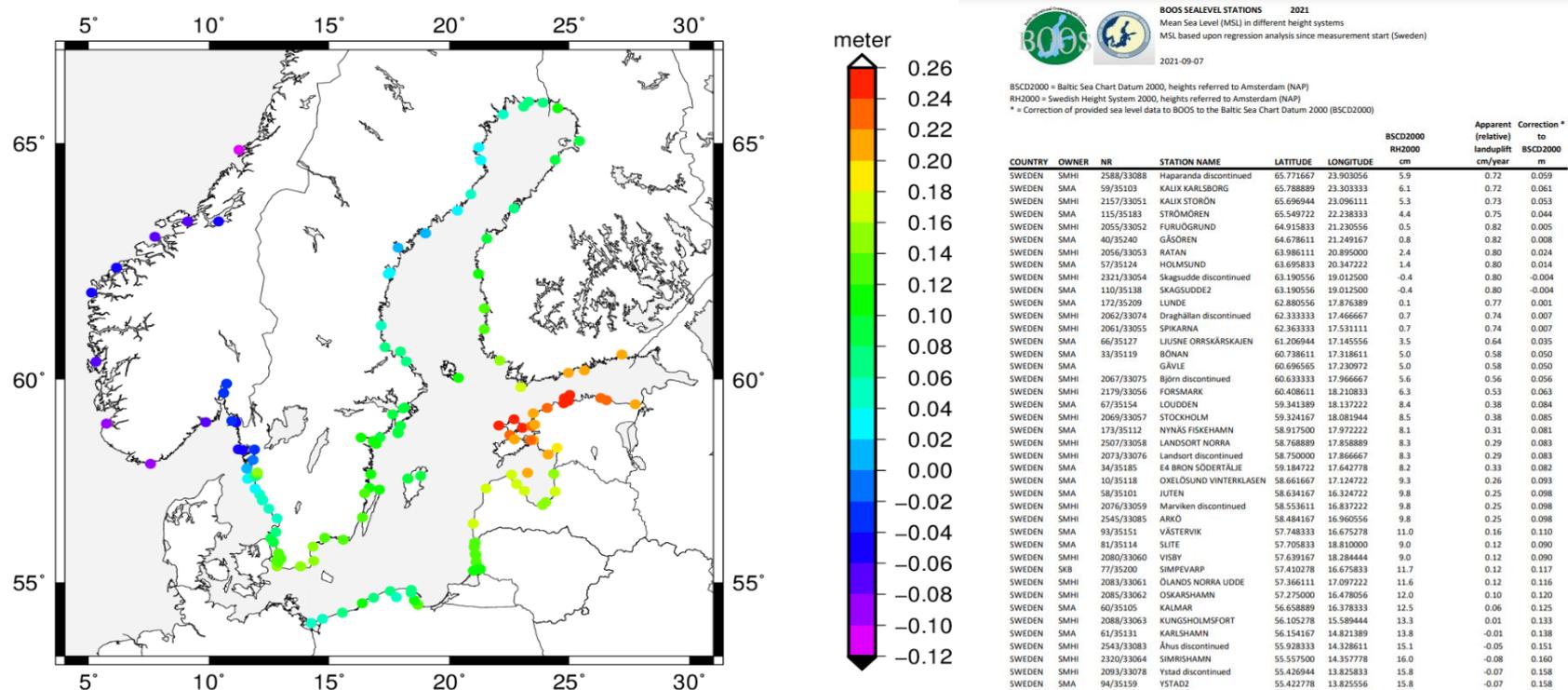


Fig. 4b: Differences between the reference levels of the old national chart datums with respect to Baltic Sea Chart Datum 2000 (BSCD2000). In Sweden and Finland, the old reference levels are equal to Mean Sea Level transferred to year 2020 (according to different national conventions). The values from Norway shows the Mean Sea Level over the period 1996-2014, relative NN2000/BSCD2000. In Estonia, Latvia and Lithuania, the Kronstadt reference level is used as old chart datum. In Poland, the local Polish Height System Amsterdam NN<sub>55</sub> is used as chart datum. Notice how postglacial rebound reduces the magnitude of the mean sea level in the Bay of Bothnia; it is now just a few cm near the land uplift maximum. The values are shown in this [Table](#).



# Reference levels in Skagerrack

- Norwegian reference datum (LAT-20) ca 50-60 cm below BSCD2000
- Danish LAT ca 30 cm below BSCD2000

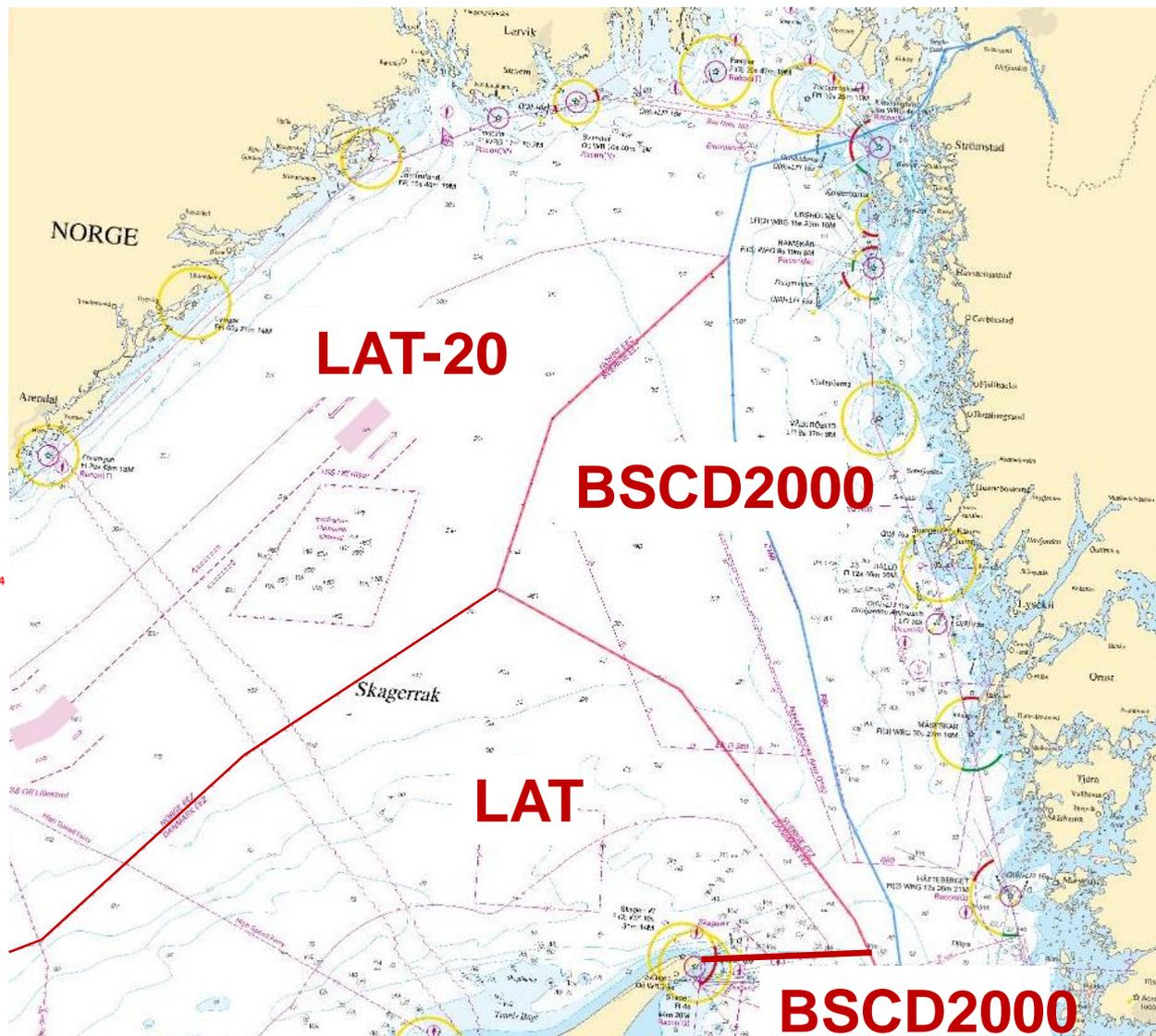
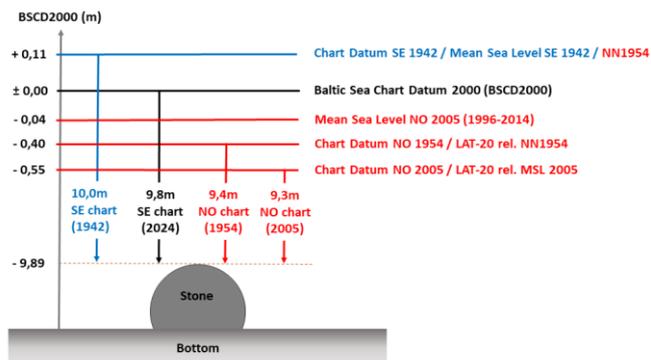


Chart datum Skagerrack (Swedish-Norwegian border)



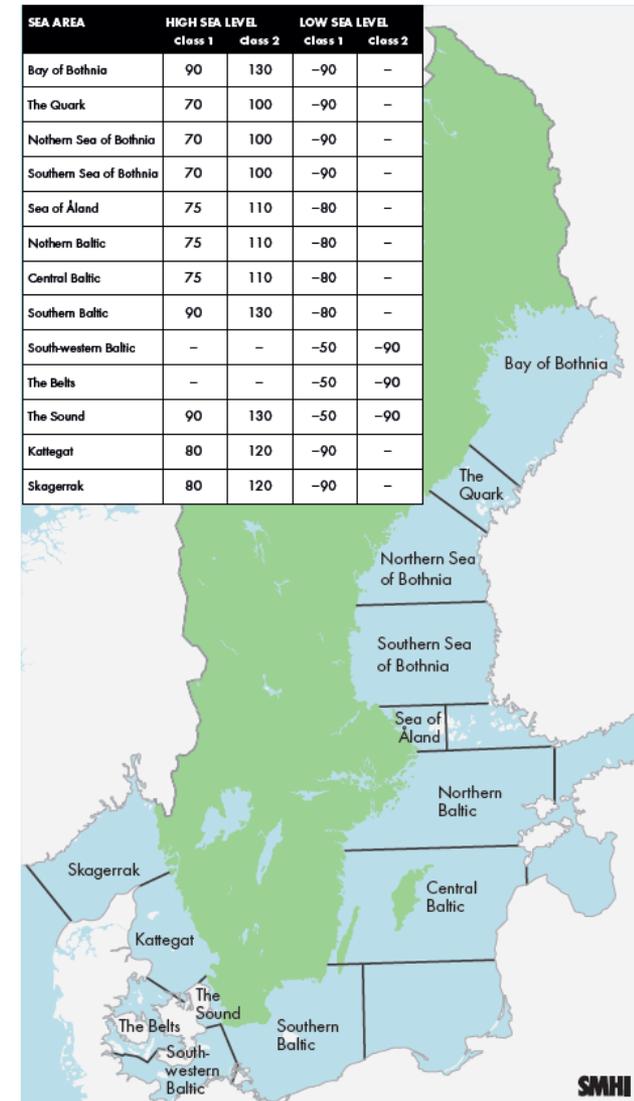
# New reference level in Sweden

SMA and SMHI presents sea level data relative BSCD2000 since 3rd June 2019



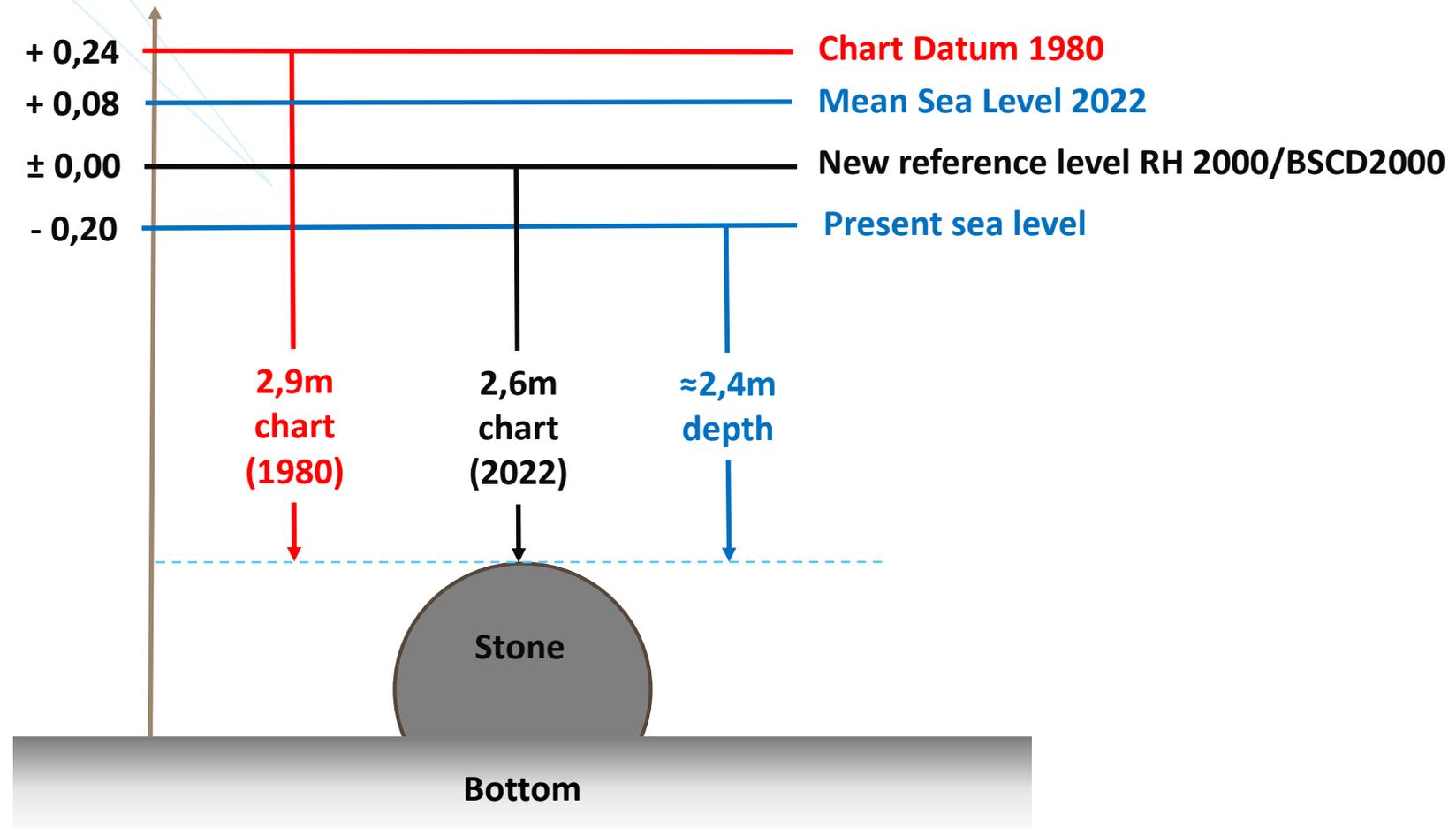
# SMHI oceanographic warning and forecasting service

- An ongoing transition to BSCD2000 (RH 2000) at SMHI -> forecasts, warnings and information about current sea level will be issued in BSCD2000
- Warning levels have been adjusted from MSL to BSCD2000
- **2019-06-03**: Warnings for high and low sea level will be issued in BSCD2000



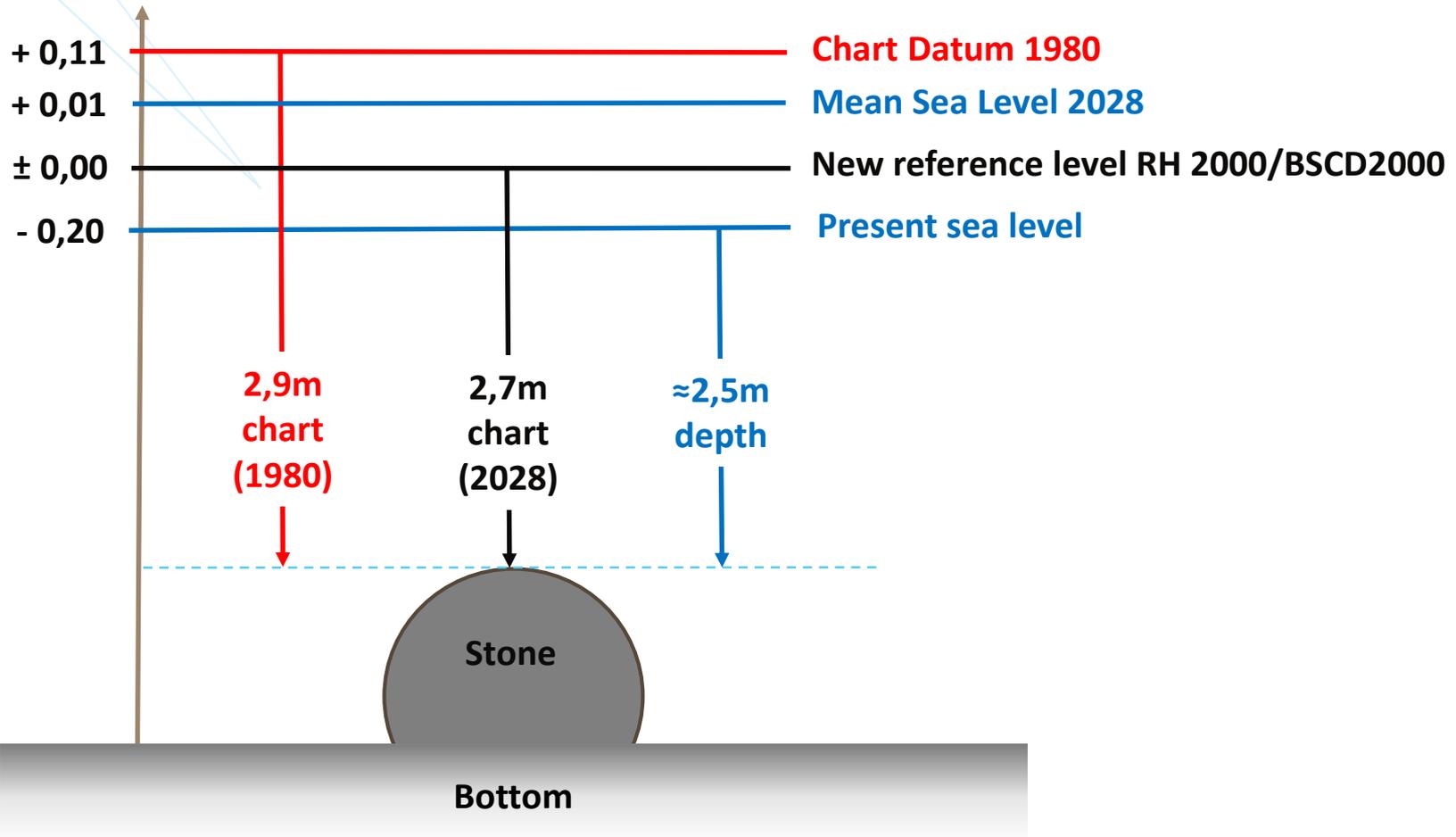
# Transition to RH 2000/BSCD2000 in charts and sea level

RH 2000/BSCD2000 (m) Stockholm



# Transition to RH 2000/BSCD2000 in charts and sea level

RH 2000/BSCD2000 (m) Göteborg-Torshamnen



# Notices to Mariners (NtM)

\* 14040

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

Expired notices: 2019:754/13917

See: 2018:716/13140

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

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

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

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

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

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

*SMHI och Sjöfartsverket. Publ. 15 May 2019*

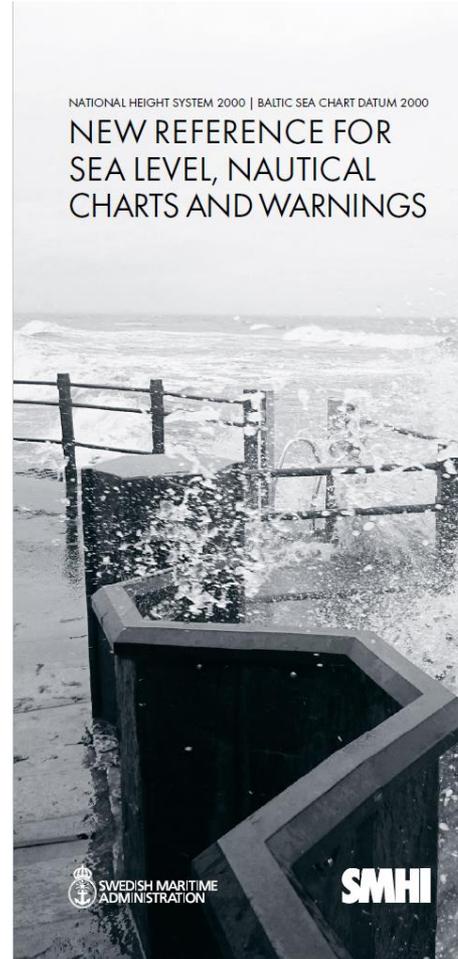


# New info sheets about the transition to BSCD2000 as the new reference level for sea level, nautical charts and warnings

## Svensk



## English



# A uniform reference system from land to sea

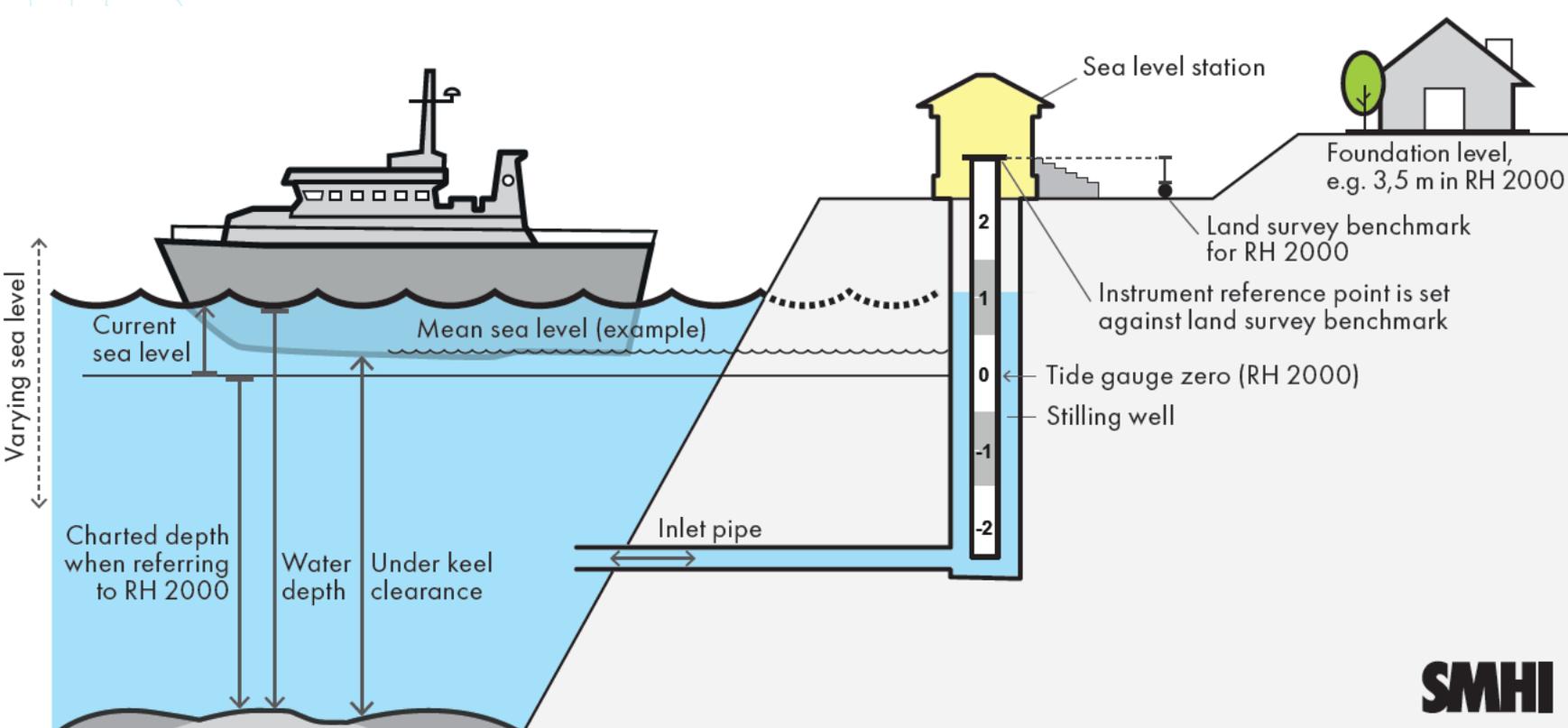
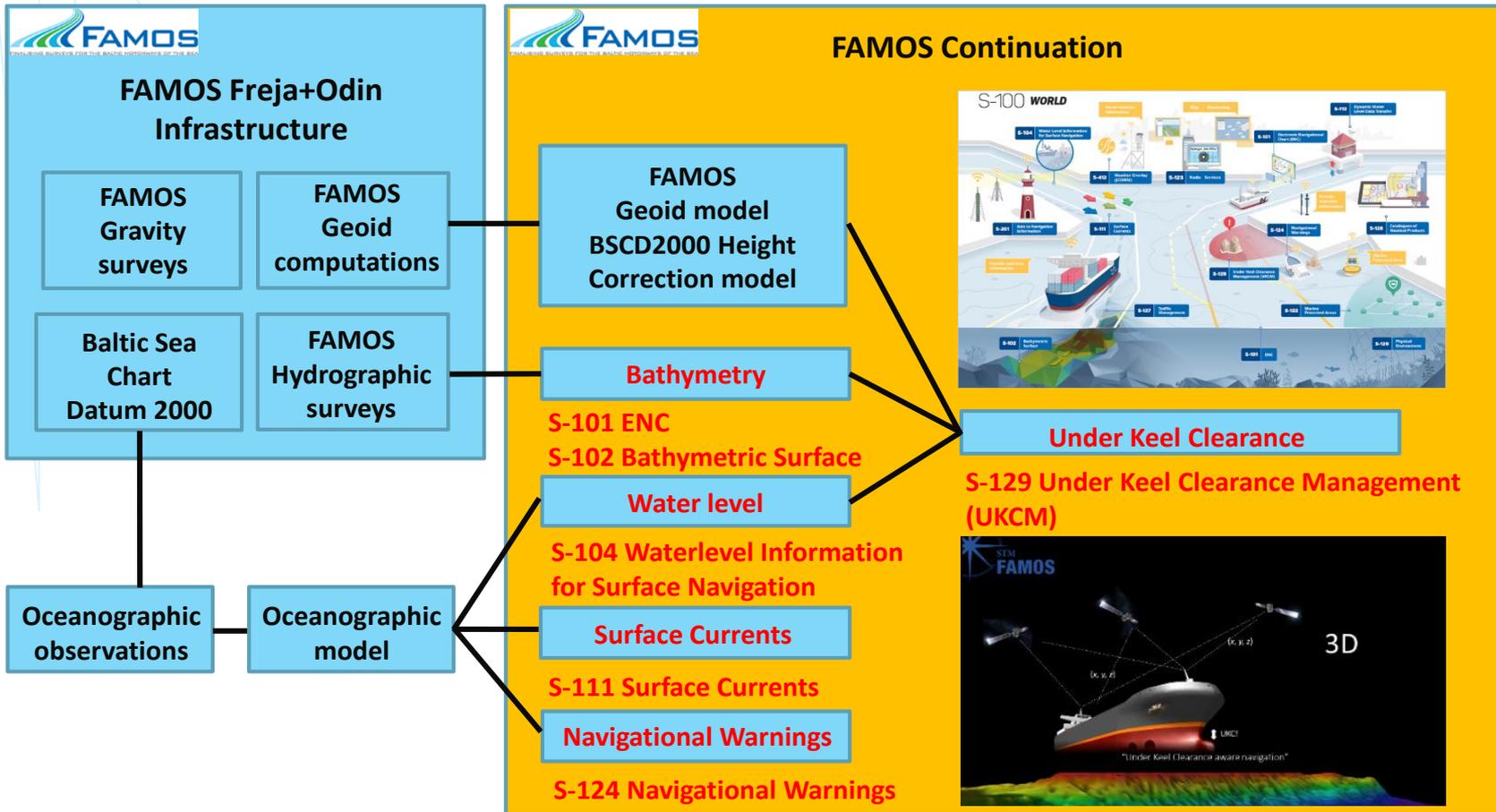


Illustration Veronica Wärm SMHI



# FAMOS Continuation



Thanks!



Thomas Hammarklint

Swedish Maritime Administration (SMA)

[Thomas.Hammarklint@sjofartsverket.se](mailto:Thomas.Hammarklint@sjofartsverket.se)