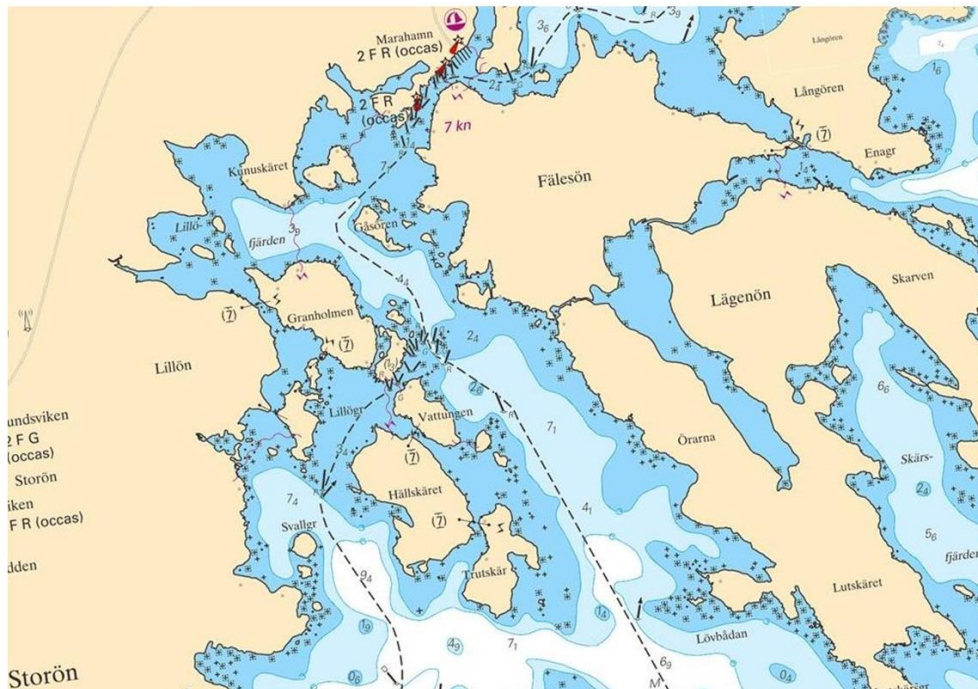


Baltic Sea Chart Datum 2000 – a common reference level for nautical charts and sea level information in the Baltic Sea



2019-04-11 TWCWG4/GLOSS GE XVI-meeting, Busan, Korea

Thomas Hammarklint Thomas.Hammarklint@sjofartsverket.se





BALTIC SEA HYDROGRAPHIC COMMISSION

<http://www.bshc.pro>



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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



BALTIC SEA HYDROGRAPHIC COMMISSION



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BSHC Chart Datum Working Group

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



Photo: Chart Datum Working Group 10th meeting, 7-8 February 2018, Arkö, Sweden

The CDWG plans to have its next meeting (CDWG12)
3-4 March 2020 in Gdansk, Poland

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

Members of CDWG:

Denmark PhD Joanna Gerlings
Denmark Mr Philip Sigaard Christiansen
Estonia Mrs Gabriela Kotsulim
Finland Mr Jyrki Mononen
Germany Dr Patrick Westfeld
Latvia Mr Armands Murans
Lithuania Mr Mindaugas Zakarauskas
Poland Cdr Sławomir Lipiński
Poland Mr Witold Stasiak
Russia Capt S. Travin
Russia Mr Leonid Shalnov
Russia Dr Sergey V. Reshetniak
Sweden Mr Thomas Hammarklint (Chair)
Sweden Mr Lars Jakobsson
Sweden Mr Henrik Tengbert

Representative of BOOS:

Sweden Mr Thomas Hammarklint

Observers:

Finland Mrs Mirjam Bilker-Koivula
Finland Katri Leinonen
Germany Dr Gunter Liebsch
Norway Mr Aksel Voldsund
Sweden Dr Jonas Ågren
Sweden Dr Per-Anders Olsson
Sweden Mr Mikael Stenström

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

Baltic Sea Chart Datum 2000 (BSCD2000)

➤ 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.

➤ 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).

➤ 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

➤ 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)



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



FCD Register

- Domain: - Item Type: - Status: - Search:

[Go to index](#)

Details		Management Details	
Item Type :	Enumerated	Proposal Type :	Addition
Domain :	IHO Hydro	Submitting Organization :	SHN
Associated Attribute :	<input type="text" value="verticalDatum (Value)"/>	Proposed Change :	Addition of an enumerated value for verticalDatum.
EnumeratedName:	Baltic Sea Chart Datum 2000	Justification :	The Baltic Sea is an international shallow, non tidal area in the northern part of Europe with dense traffic. IHO BSHC has approved this name and the adoption of the Baltic Sea Chart Datum 2000.
Enumerated Value Code Number :	44	Proposed :	2008-10-17
Enumerated Value Code In Use :		Accepted :	2008-10-10
Alias :	Unspecified	Amended :	
CaseName :	balticSeaChartDatum2000	Successor :	-
Definition :	(BSCD2000) - 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 normal Amsterdam Pot (NAP).		
Reference :	Baltic Sea Hydrographic Commission		
Definition Source :	Unspecified		
Similarity to Source :	Unspecified		
Int1 :	<input type="text" value=""/>		
S4 :	<input type="text" value=""/>		
Remarks :	Unspecified		

[Back](#)



BSCD2000 is included as a reference plane in BODC Vocabulary list / SeaDataNet



PAN-EUROPEAN INFRASTRUCTURE FOR
OCEAN & MARINE DATA MANAGEMENT

BODC VOCAB LIBRARY

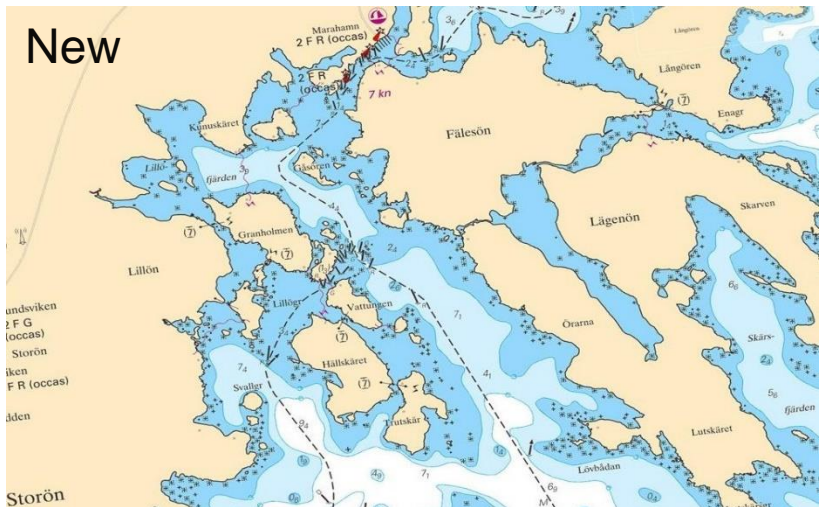
L11 (SEADATANET DEPTH MEASUREMENT REFERENCE PLANES)

[Overview](#) | [Export subset of list](#) | [Export full list](#) | [New query](#) | Found 1 | Current | Previous | Next

ConceptID ↕	Preferred label ↕	Alt label ↕	Definition ↕	Modified ↕
D33	Baltic Sea Chart Datum 2000	BSCD2000	The elevation of the zero metres contour in the Baltic Sea as approved by the IHO Baltic Sea Hydrographic Commission as the common chart datum for the Baltic Sea. The datum refers to each Baltic country's realization of the European Vertical Reference System (EVRS), which is connected to the Normaal Amsterdams Peil (NAP).	5/22/2017 16:41:48



Swedish Chart Improvement project

Mean Sea Level (Baltic Sea Chart Datum 2000^{RH2000})

Plan for transition from MSL to BSCD2000 in nautical charts

Updated 2018-06-26

BSCD2000 and NSL updated

- Haparanda – Bjuröklubb
2015-09-01 – 2017-09-30
- Bjuröklubb – N. Kvarken
2017-10-01 - 2018-03-29
- N. Kvarken - Högbonden
2018-03-30 - 2018-08-16
- Högbonden - Härnösand
2018-08-17 - 2018-09-14
- Härnösand - Gävle
2018-09-15 - 2019-01-23
- Gävle - Simpnäsklubb
2019-01-24 - 2019-02-20
- Simpnäsklubb - Vaxholm
2019-02-20 - 2019-03-19
- Vaxholm - Landsort
2019-03-20 - 2019-09-13
- - - Landsort - Utklippan
2019-09-13 - 2020-08-14
- Gotland
2020-08-15 - 2020-09-30
- - - Utklippan - Kullen
2020-10-01 - 2021-01-05
- - - Kullen - Strömstad
2021-01-06 - 2021-03-23



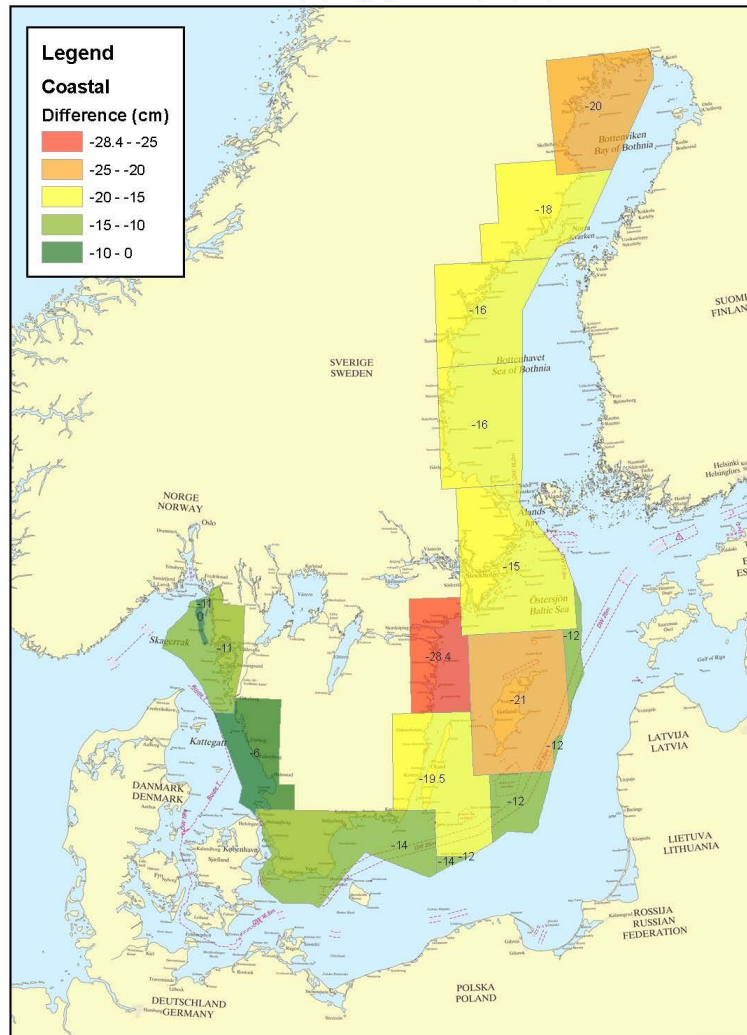
Difference between present chart datum and BSCD2000

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



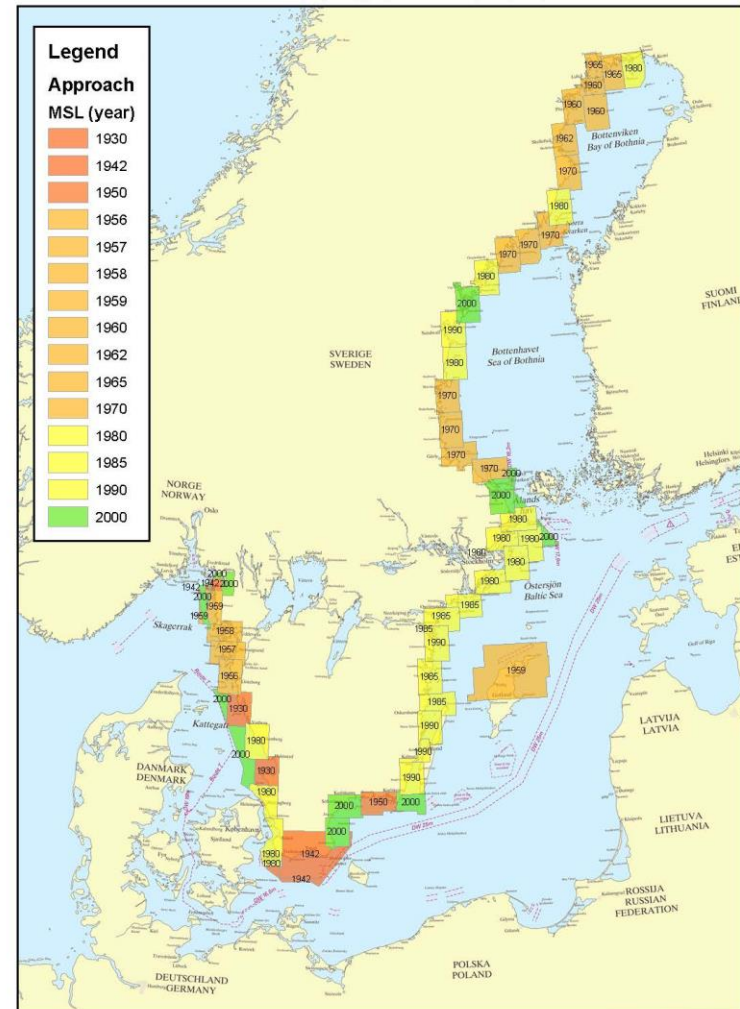
1 centimeters = 60 kilometers

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

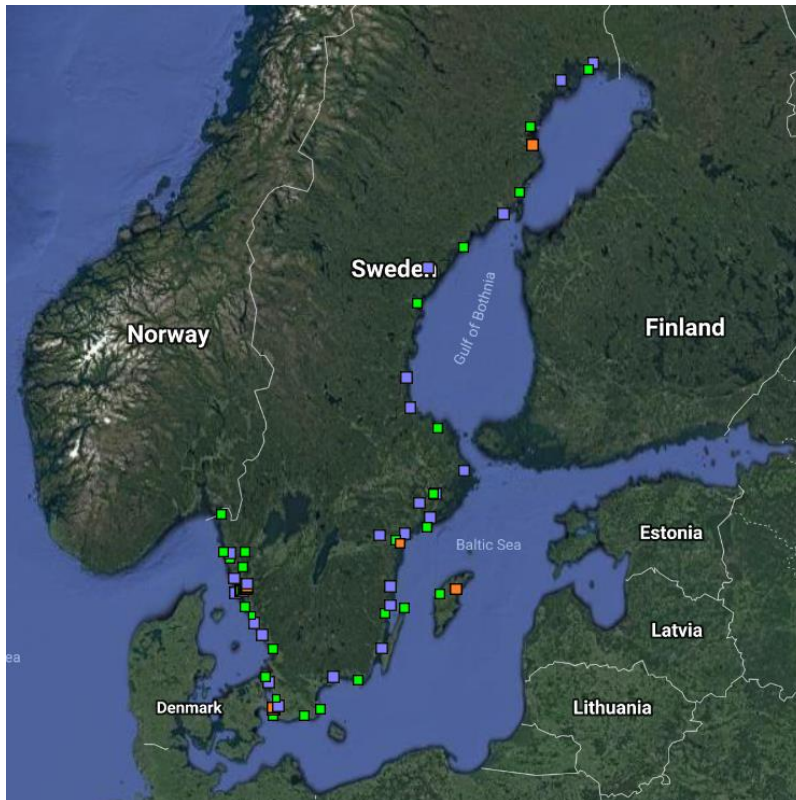


1 centimeters = 60 kilometers

Swedish Sea Level Network (SHIP)



Co-financed by the European Union
Connecting Europe Facility



- Real-time data in BSCD2000 from 59 stations
- 1-minute values with 1 cm accuracy
- Real-time and delayed mode quality control

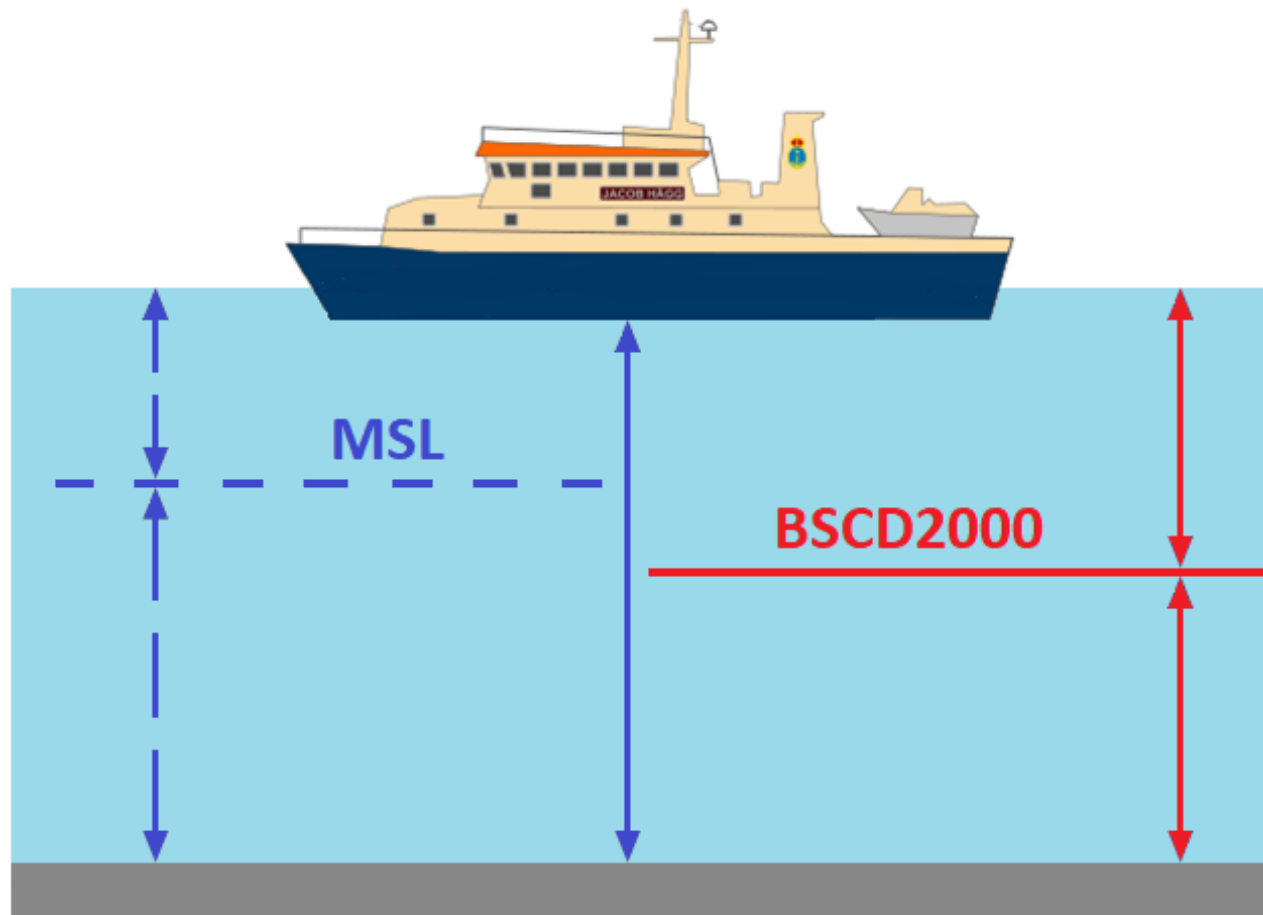


Class I	Upgrade with battery backup
Class II	Upgrade without battery backup
Class III	Unchanged, temporary

27 stations (24 SMHI + 3 SMA)
26 stations (26 SMA)
6 stations (6 SMA)

SMHI

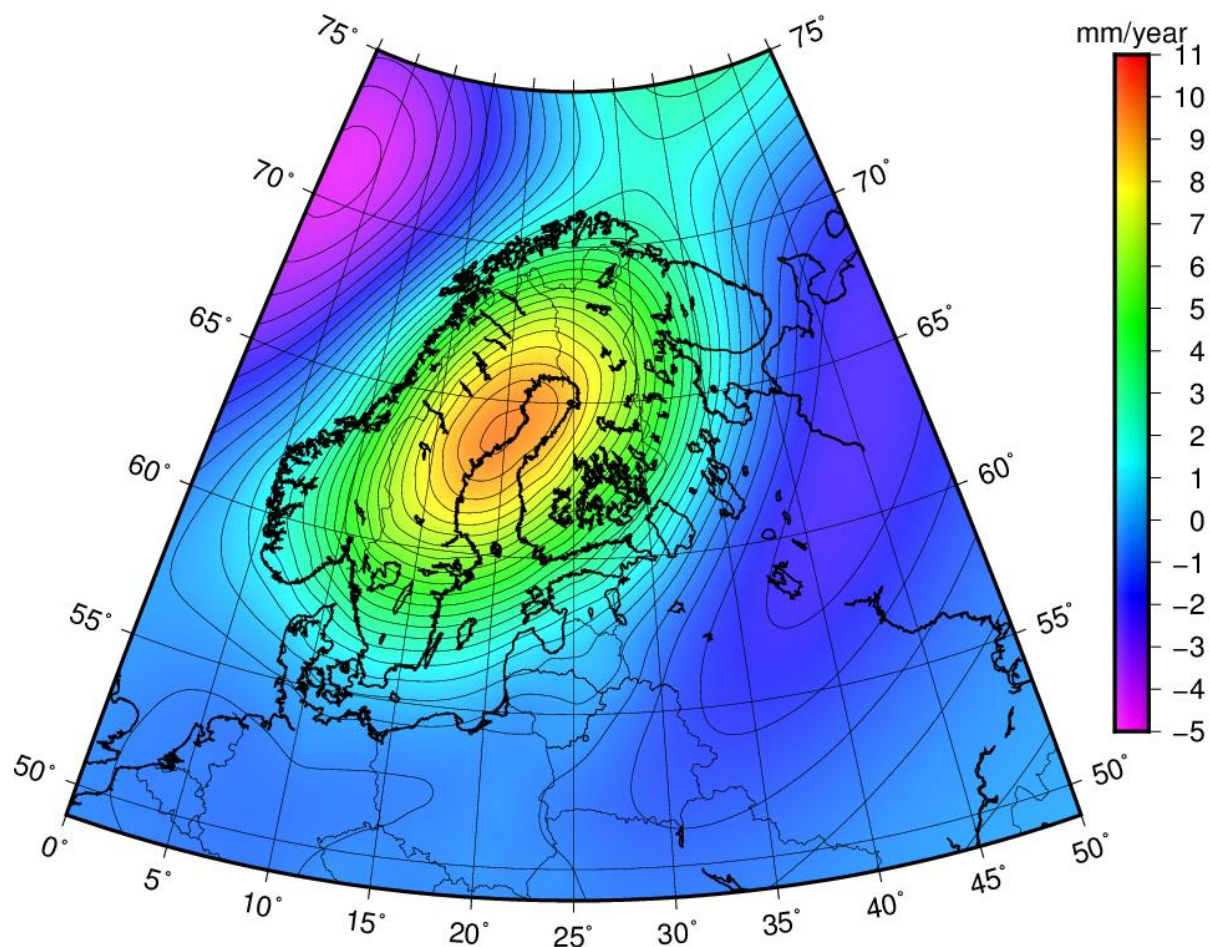
New reference datum for sea level



The water depth remains!



The land-uplift lowers the mean sea level



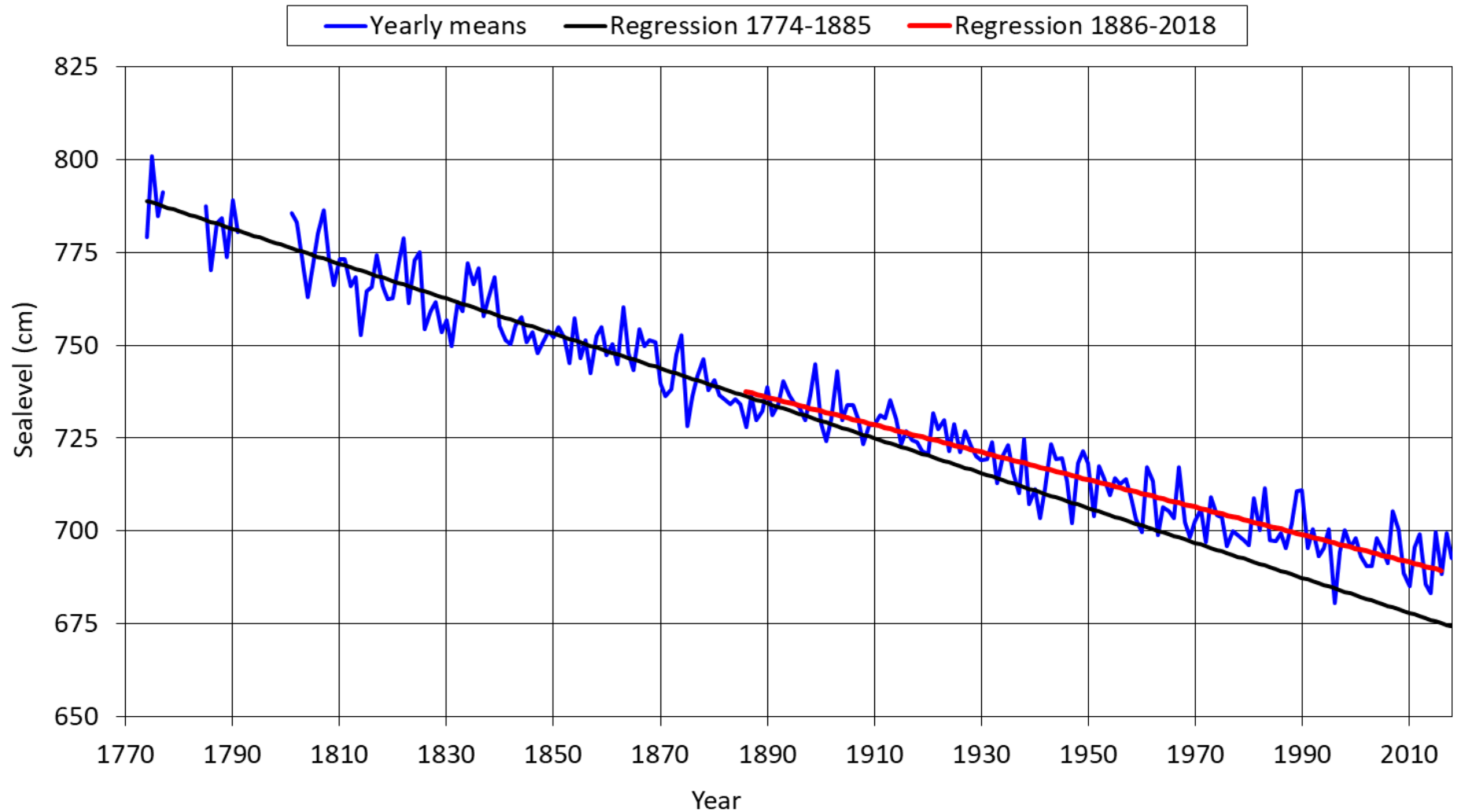
(NKG2016LU_LEV, rates relative to the geoid)



Stockholm

"World's longest sealevel record"

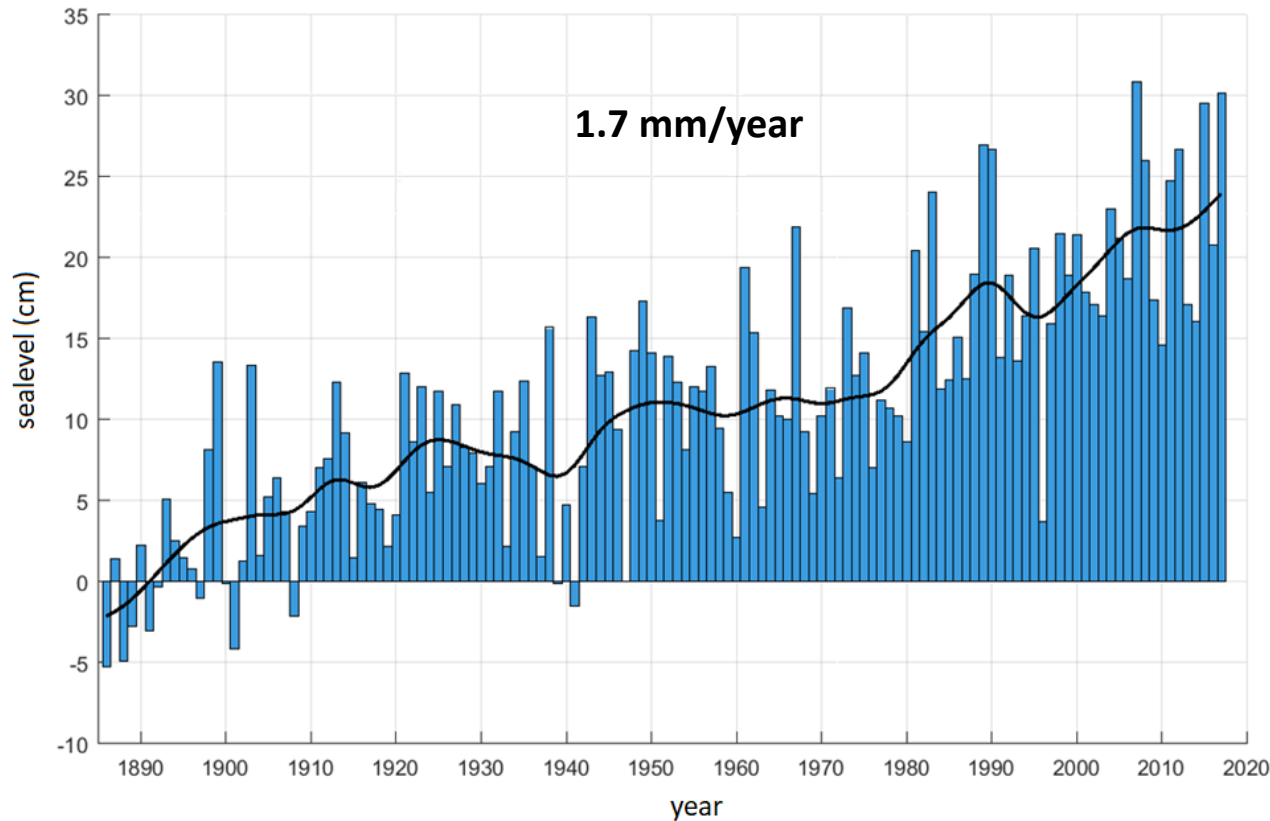
Sealevel Stockholm 1774 - 2018



The sea level rise raises the mean sea level

SMHI

Sea level rise 1886 - 2017

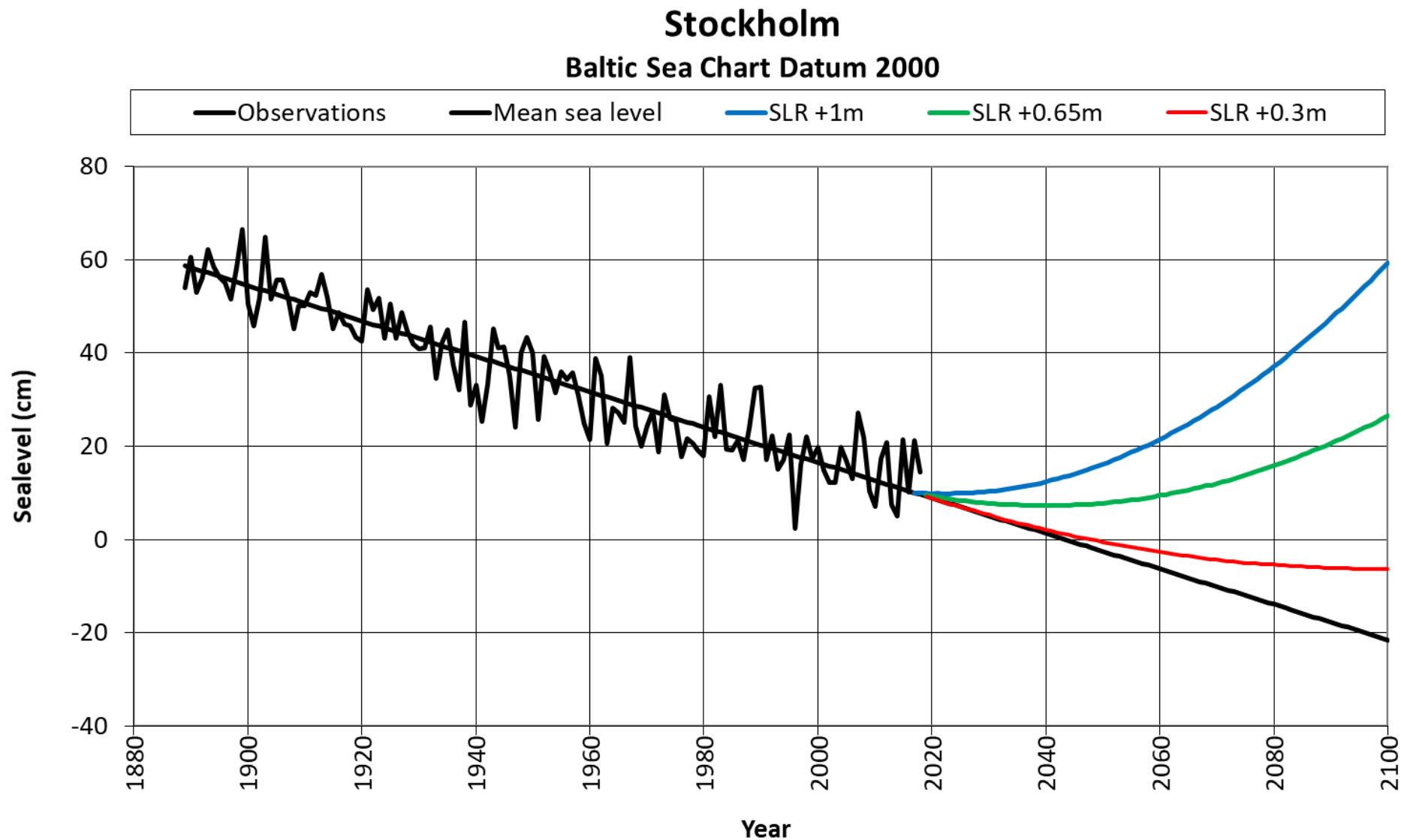


Analysis of 14 Swedish sealevel records since 1886

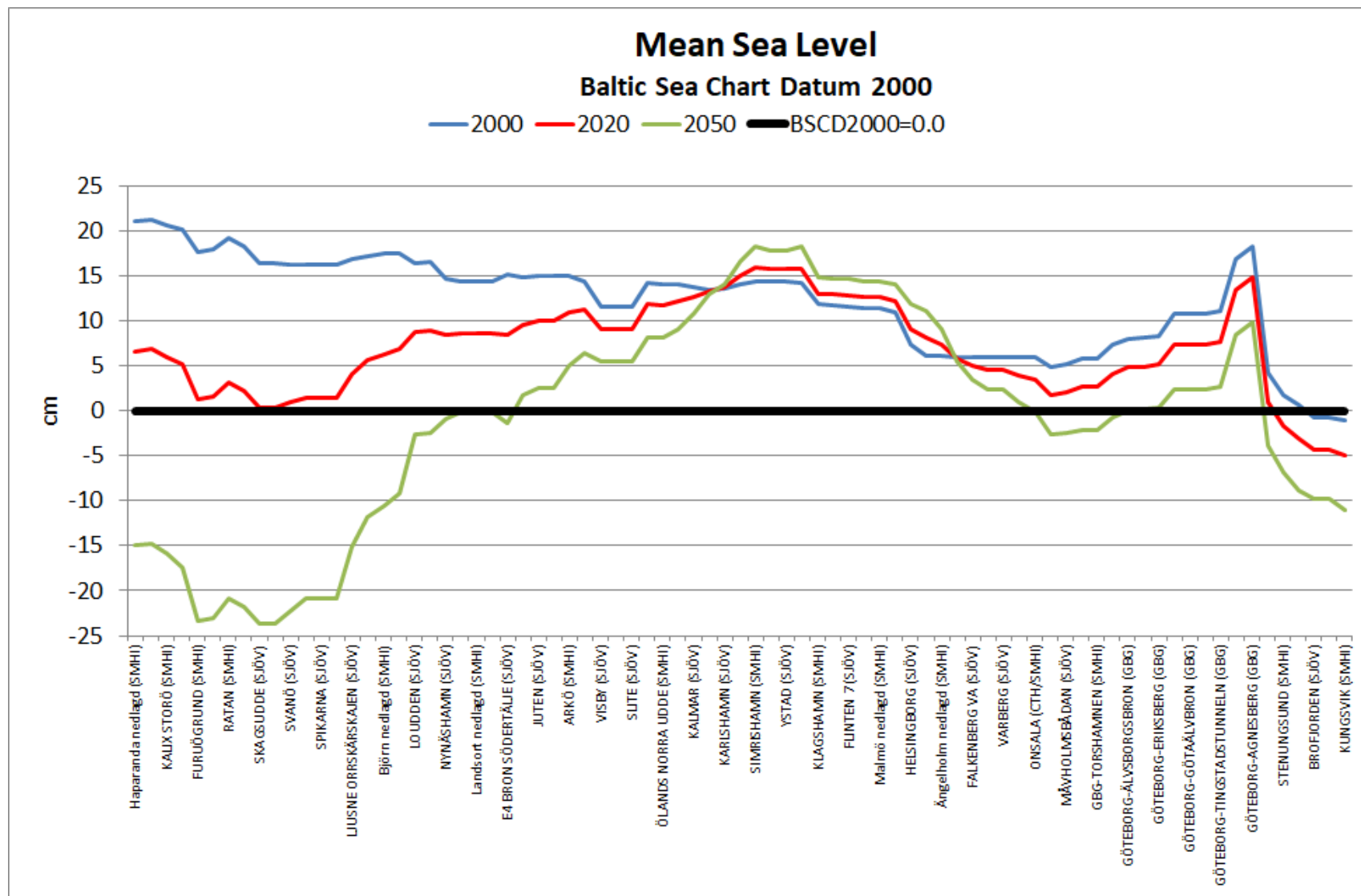
Sealevels corrected for the levelled land-uplift (glacial isostatic adjustment)



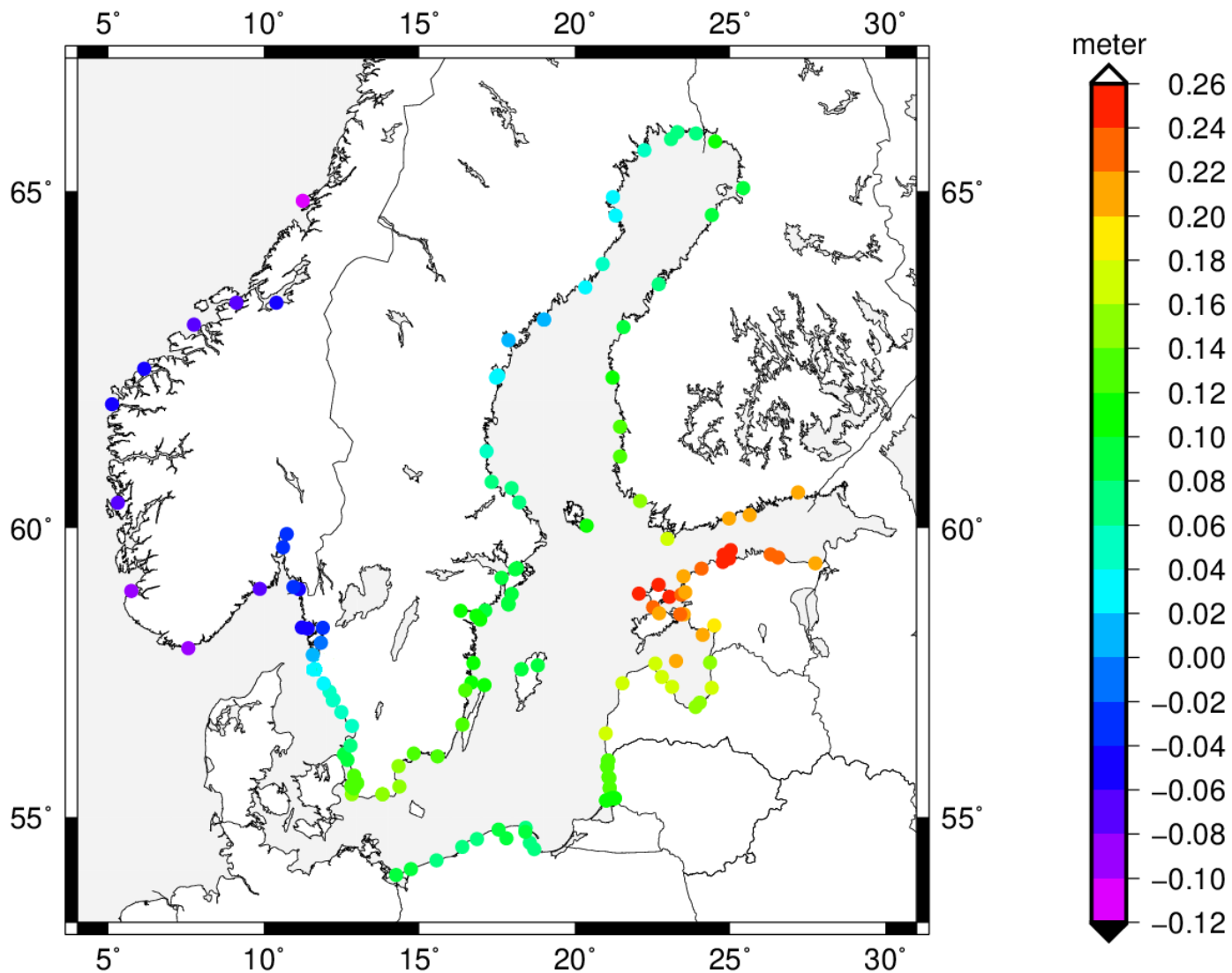
Future sea level rise (SLR)



Changing mean sea level

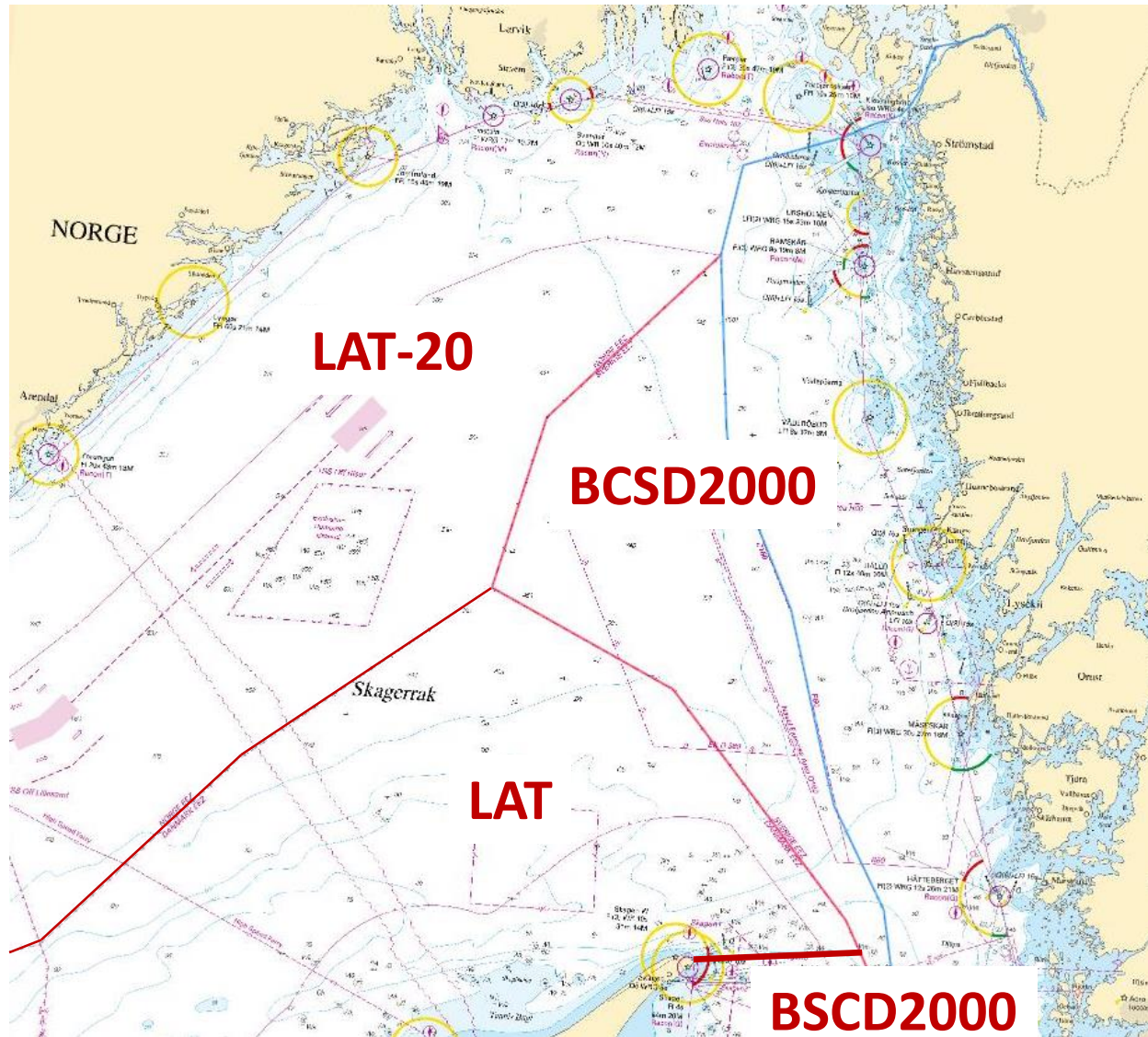


MSL 2019 in BSCD2000



Reference datums in Skagerack

- Norwegian chart datum (LAT-20) ca 0,5-0,6 m below BSCD2000
- Danish LAT ca 0,2 m below BSCD2000



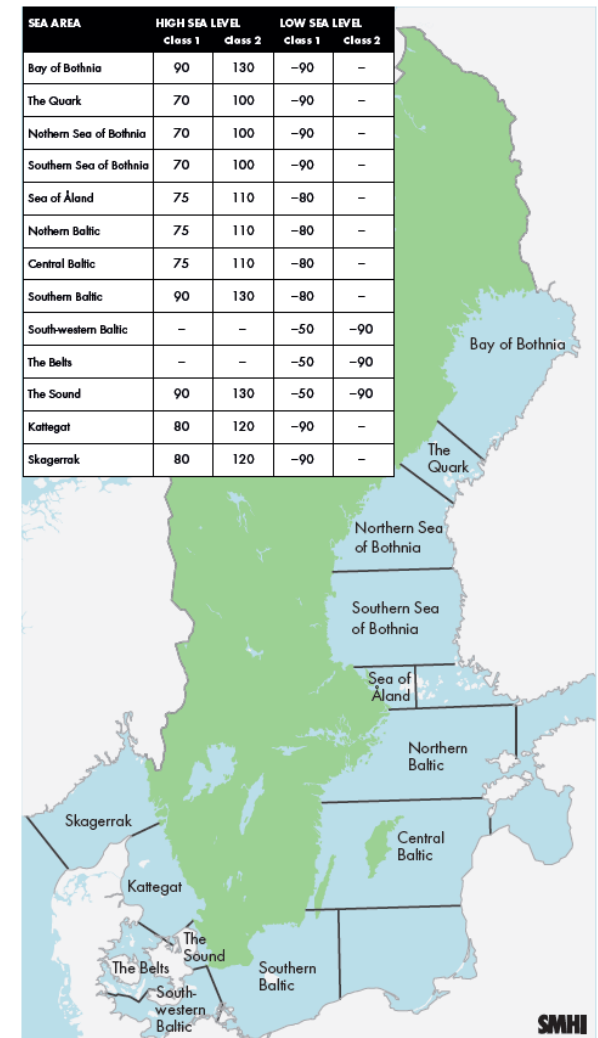
Sweden will change reference datum

Swedish Maritime Administration (SMA) and
Swedish Meteorological and Hydrological
Institute (SMHI) will present sea level data
relative BSCD2000 from 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



New Sealevel service from SMHI

Kalix-Storön

SMHI:s mätstation

Stäng X

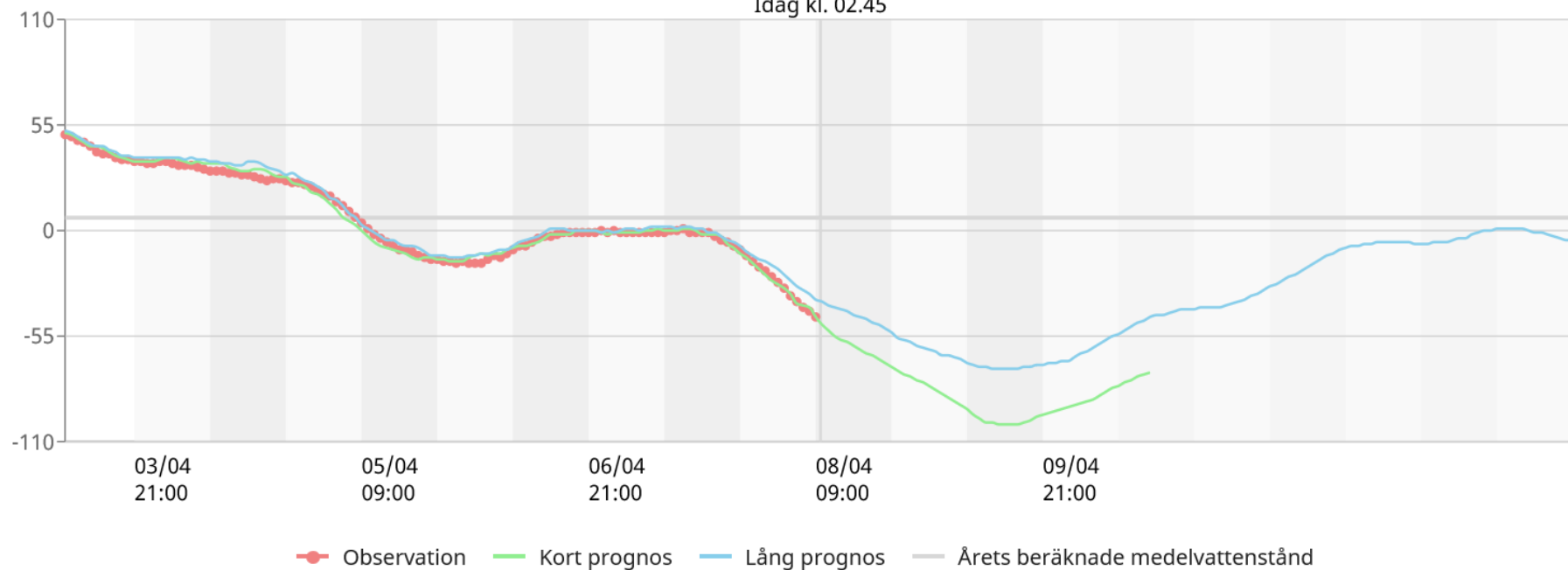
Välj tidsspänn: Fler dygn Närtid

☆ Spara som favorit

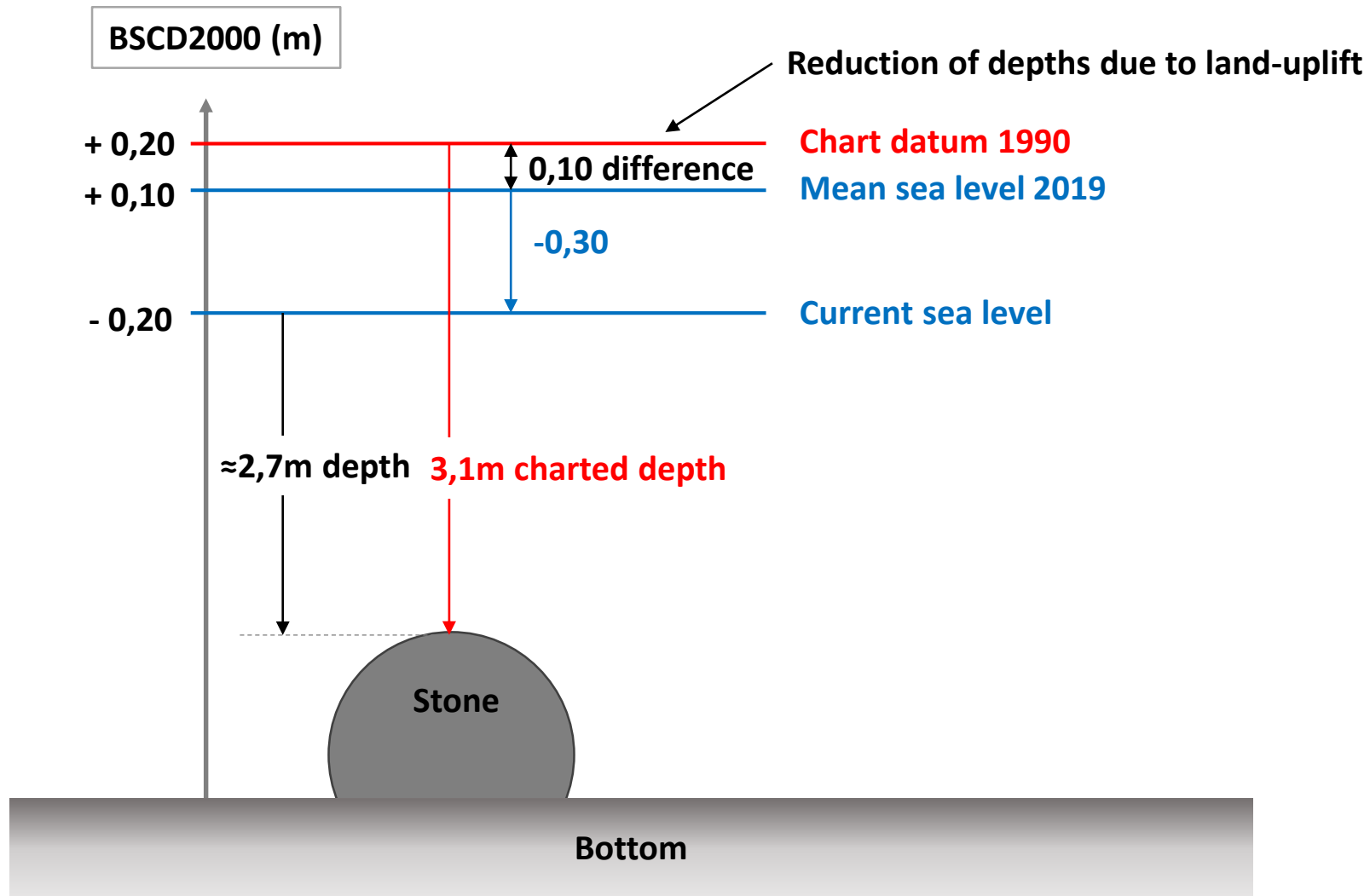
Diagram Tabell

Vattenstånd (cm i RH 2000)

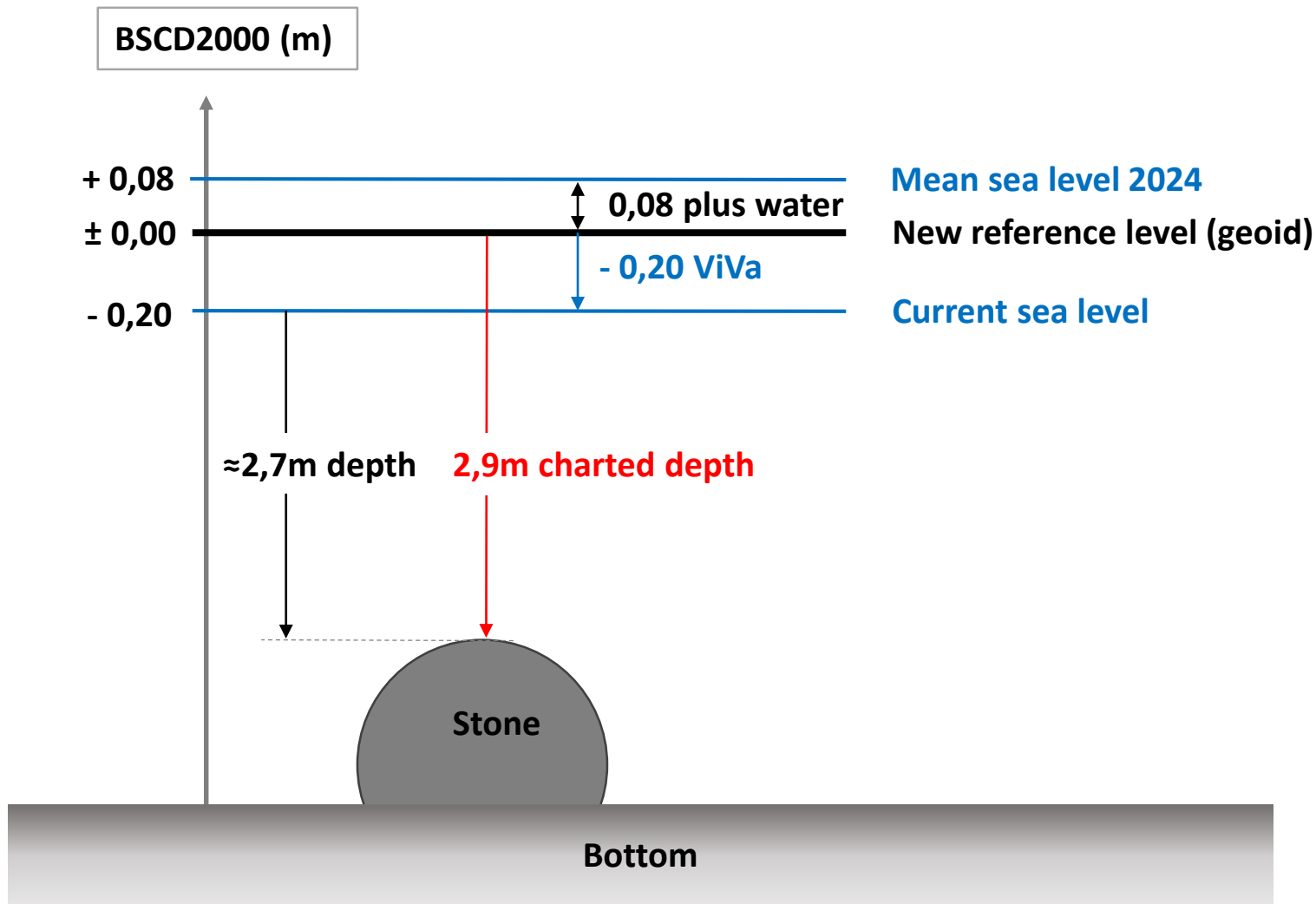
Idag kl. 02.45



Present situation (2019)



Future situation (2024)



Notices to mariners

Example from Estonia, 2017-12-01

http://adam.vta.ee/teenused/tm/2017/TM_No.12-2017.pdf

Preliminary notice

New vertical chart datum BSCD2000 - Baltic Sea Chart Datum 2000

On 01 January 2018, the common European height system EVRS (European Vertical Reference System) will be adopted in Estonia, which means that the absolute heights and depths are going to be given with reference to the Amsterdam Ordnance Datum (*Normaal Amsterdams Peil, NAP*).

There is an international agreement to start using on the charts of the Baltic Sea and in navigational information a common vertical chart datum that corresponds to the new height system and is called the Baltic Sea Chart Datum 2000 (BSCD2000). In Estonia, EVRS heights are marked with the abbreviation EH2000, with EH referring to Estonian Heights and 2000 to the land uplift in 2000. Navigational charts and reference books about Estonian navigable waters, on which heights are given in accordance with EH2000, will be marked by the Estonian Maritime Administration as Baltic Sea Chart Datum 2000 ^{EH2000}.

The transition from the 1977 Baltic height system BHS-77 to the common European height system means that 14 to 26 centimetres will be added to the absolute heights, depending on the area, and subtracted from the depths in coastal waters.

The new navigational charts compiled starting from 01 January 2018 will give the data on heights and depths in accordance with the new height system and refer to the new vertical chart datum BSCD2000. At first, electronic berthing and harbour charts will be updated, and on the basis of these corresponding paper charts will be compiled.

Introducing the new height system on all navigational charts is a time-consuming process that will take at least 7 years. During that period, navigational charts compiled according to the old and the new height system will be used simultaneously. It is extremely important therefore to consider both the zero point on the chart and the actual water level while navigating in areas with small under keel clearance



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

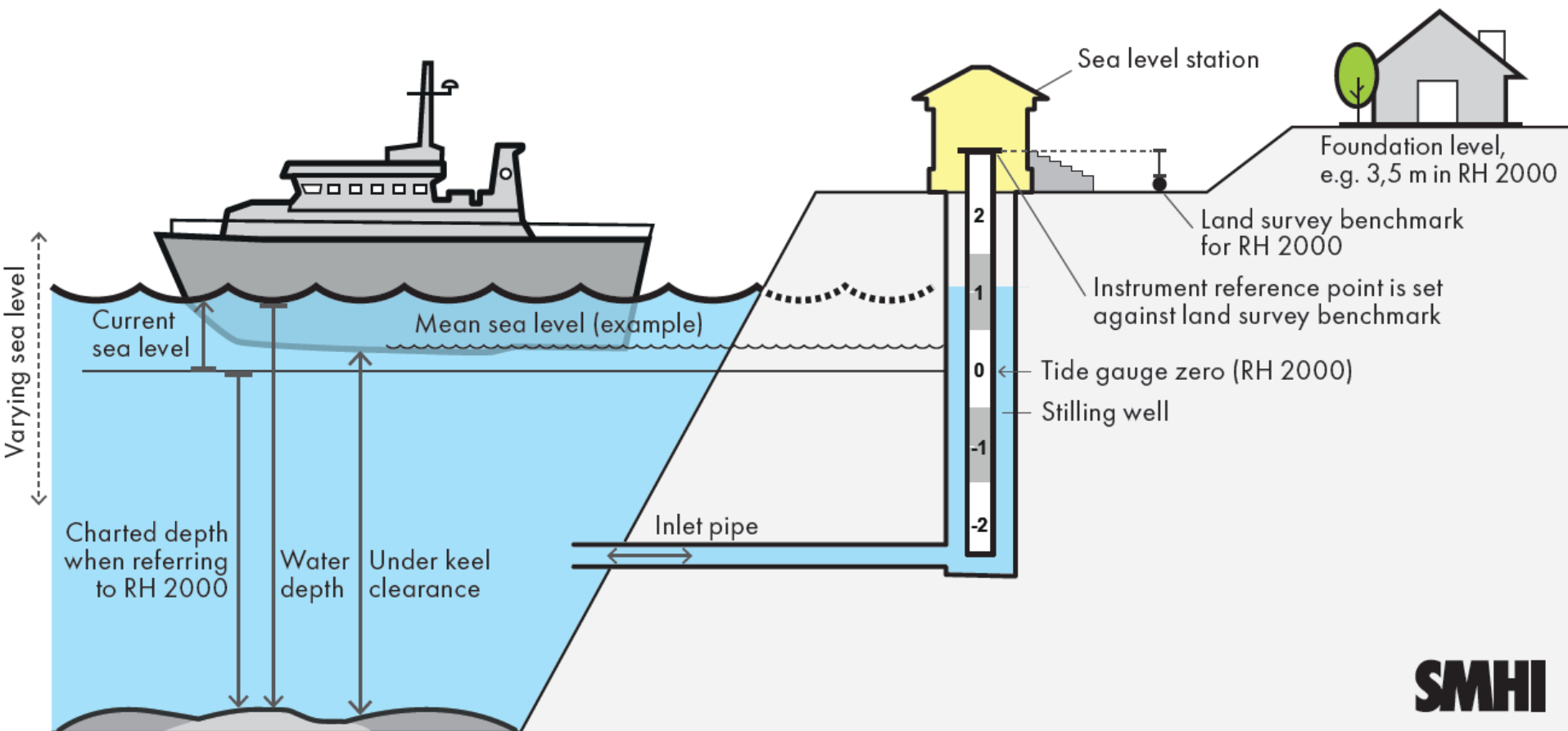
[Svensk](#)



[English](#)



A uniform reference system from land to sea



Thank you!



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Thomas.Hammarklint@sjofartsverket.se

