



**BALTIC SEA  
HYDROGRAPHIC  
COMMISSION**



# **Baltic Sea e-Nav and implementation of S-104 and S-111 in the Baltic Sea**

**2<sup>nd</sup> Chart Datum, Water level and Currents**

**Working Group meeting**

**25-26 March 2025 Tallinn, Estonia**

**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 ENCs, and the exchange of information and the harmonization of practices with regard to various issues related to hydrography.

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

#### International Hydrographic Organization

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

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

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

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

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



Photo: Chart Datum, Water level and Currents Working Group 2nd meeting, 25-26 March 2025, Tallinn, Estonia

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

### Members of CDWCWG:

Denmark	Mr Nikolaj Møller
Denmark	Mr Kristian Villadsen Kristmar
Estonia	Mrs Gabriela Kotsulim
Finland	Mr Jyrki Mononen
Finland	Mrs Anni Jokiniemi
Germany	Dr Patrick Westfeld
Latvia	Mr Bruno Špēls
Lithuania	Mr Mindaugas Zakarauskas
Poland	Mr Witold Stasiak
Poland	Mrs Alicja Olszewska
Russia	Mr Leonid Shalnov
Russia	Dr Sergey V. Reshetniak
Sweden	Mr Thomas Hammarklint (Chair)
Sweden	Mr Henrik Tengbert

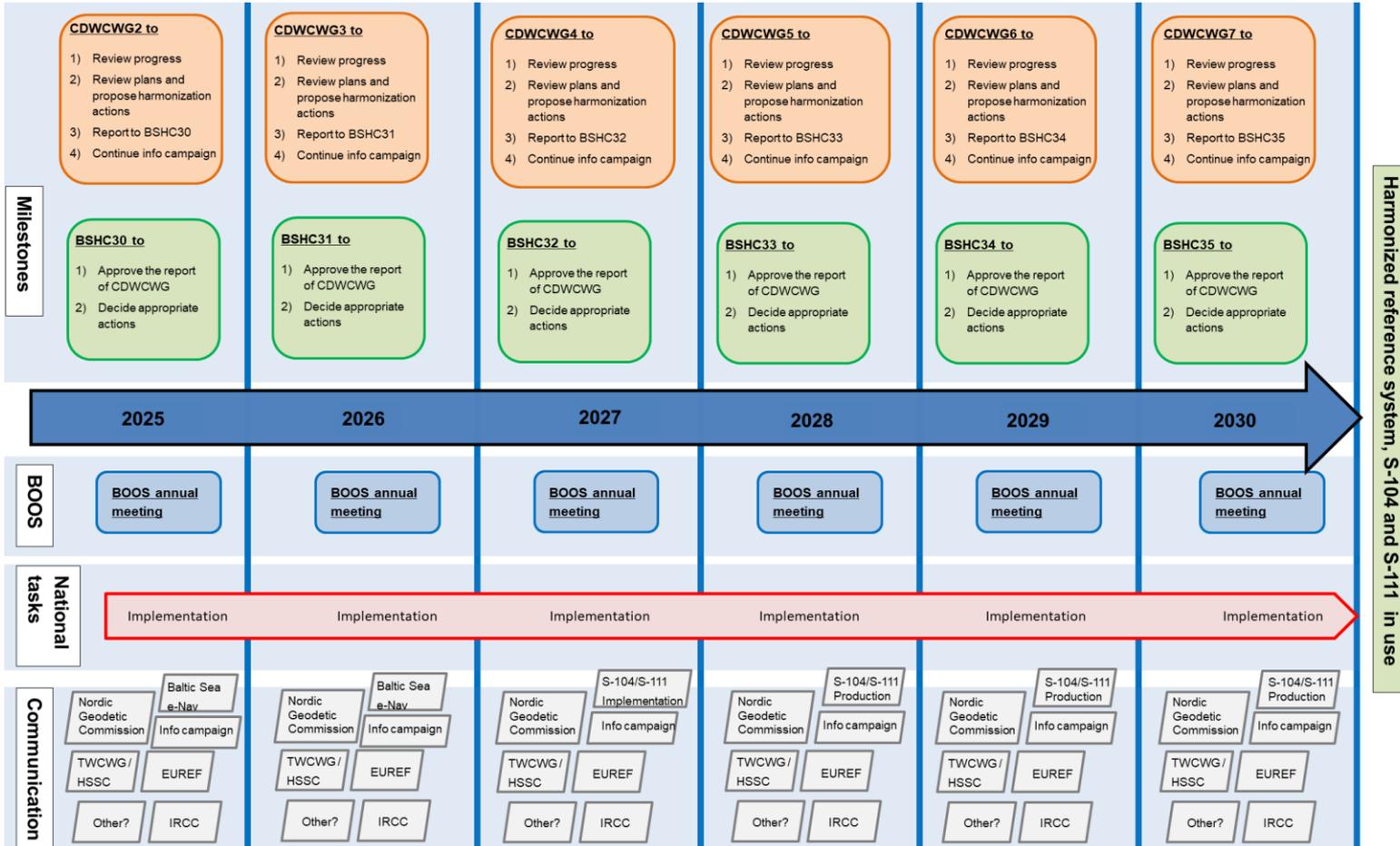
### Observers and Experts:

Estonia	Prof. Artu Ellmann
Estonia	Dr Sander Varbla
Estonia	Dr Nicole Camille Delpeche-Ellmann
Finland	Mr Jarmo Mäkinen
Finland	Dr jani Särkkä
Finland	Dr Mirjam Bilker-Koivula
Finland	Dr Timo Saari
Germany	Dr Xaver Lange
Germany	Mr Thorben Knoop
Germany	Dr Gunter Liebsch
Germany	Dr Joachim Schwabe
Latvia	Mr Armands Murans
Latvia	Mr Kristis Dzenis
Lithuania	Mr Emilis Tertelis
Lithuania	Mr Romuald Obuchovski
Norway	Mr Aksel Voldsund
Poland	Mr Krzysztof Pyrchla
Poland	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

# CDWCWG Roadmap

## RoadMap

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



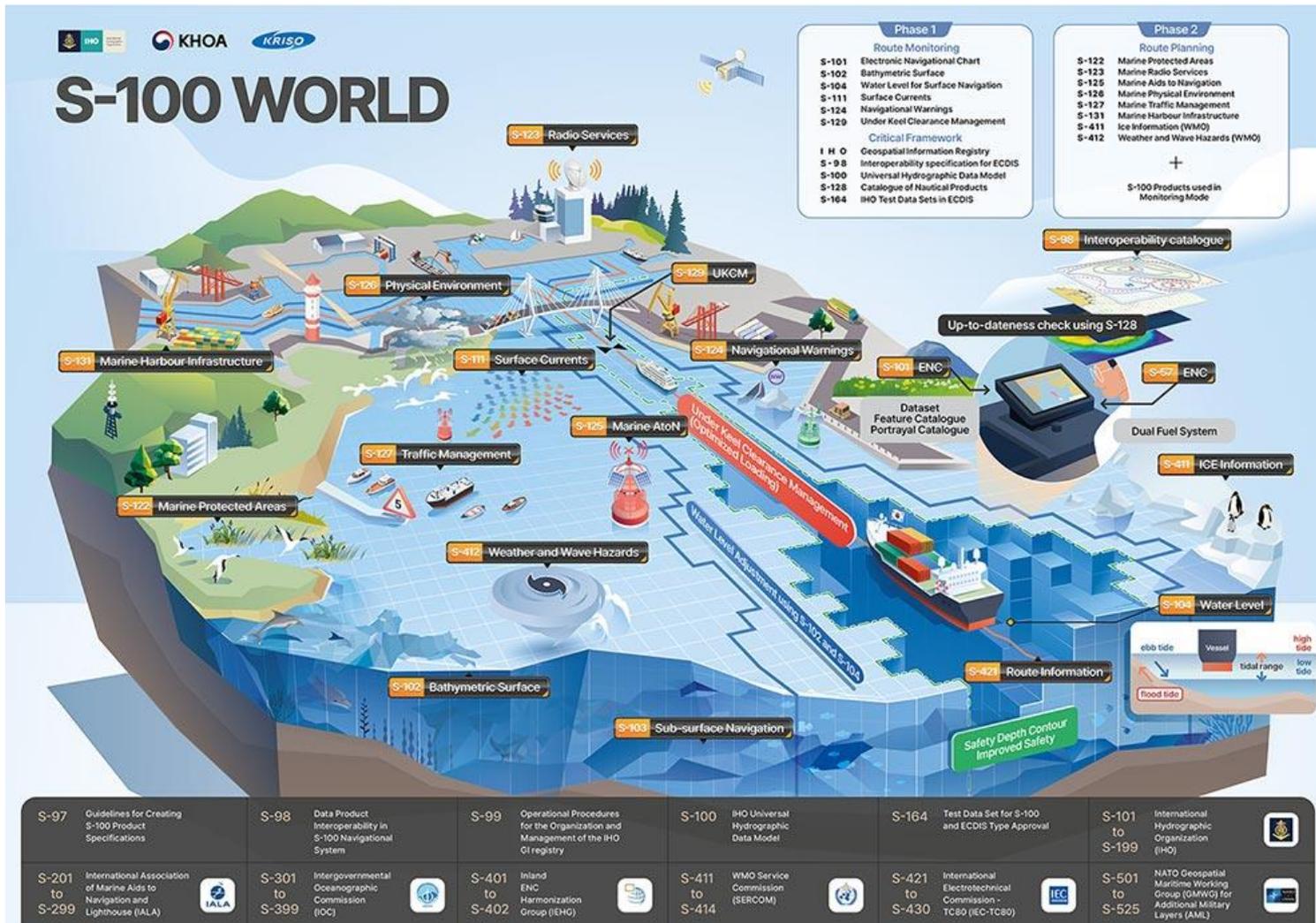
Harmonized reference system, S-104 and S-111 in use



# Future Maritime Services S-100



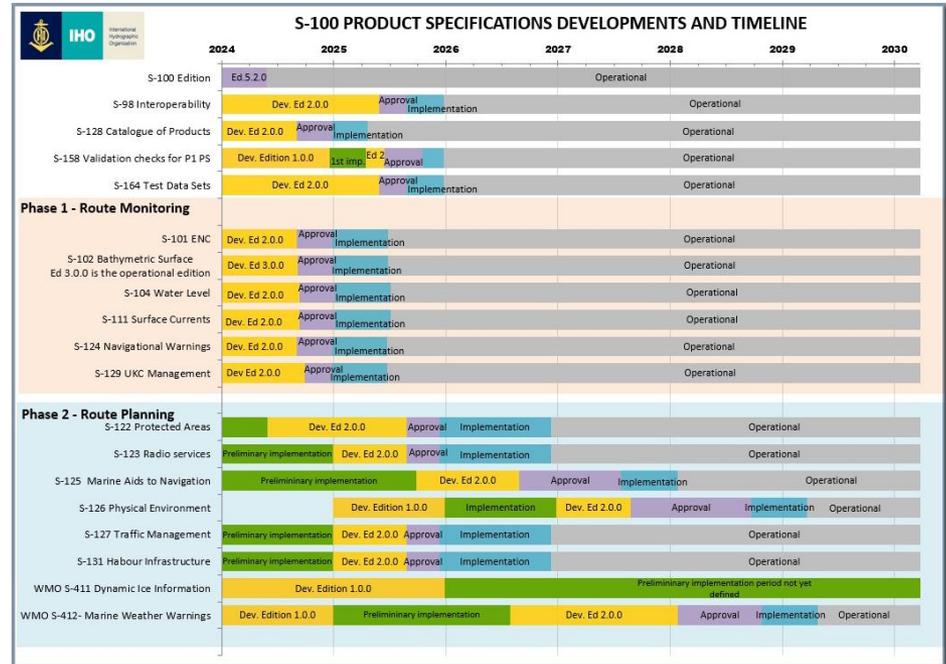
IHO



# S-100 Implementation

## IHO S-100 Implementation Strategy

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



This S-100 timeline is updated: 02 07 2024



# Real Time Hydrographic and Environmental Information Service

## Infrastructure



Co-financed by the Connecting Europe Facility of the European Union

Gravity surveys

Hydrographic surveys

Bathymetry database

Geoid model

Baltic Sea Chart Datum 2000

Oceanographic observations

Oceanographic model



**COPERNICUS MARINE ENVIRONMENT MONITORING SERVICE**  
Providing PRODUCTS and SERVICES for all marine applications

## S-100 products



**Bathymetry**

S-101 ENC

S-102 Bathymetric Surface

**Under Keel Clearance**

S-129 Under Keel Clearance Management (UKCM)

**Water Level**

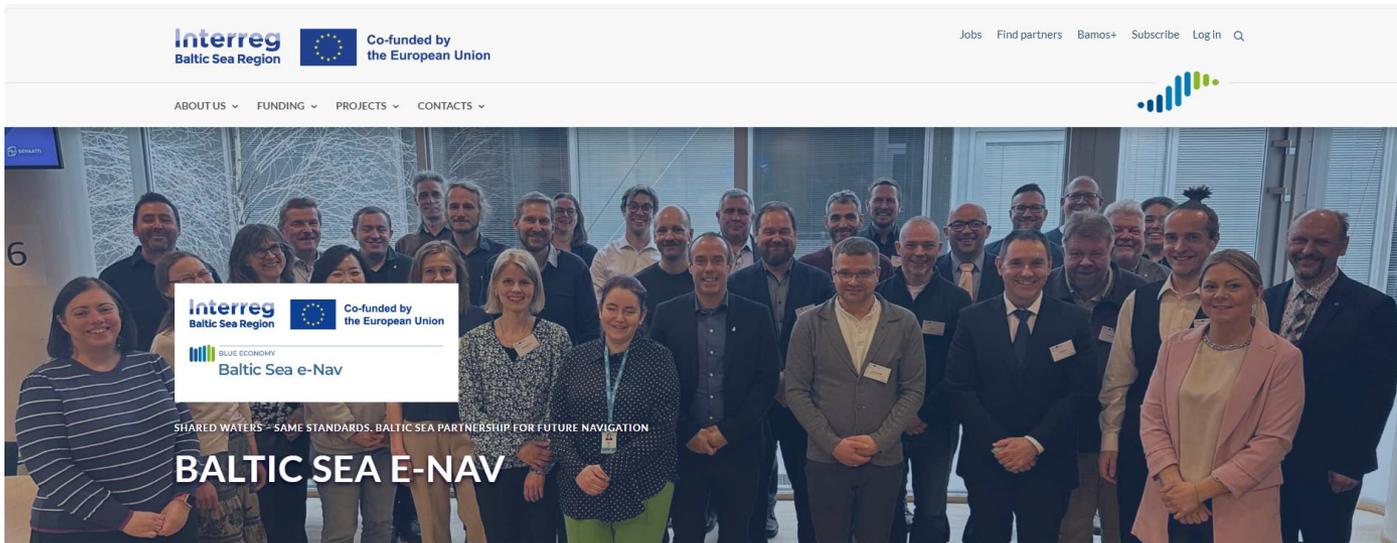
S-104 Water Level Information for Surface Navigation

**Surface Currents**

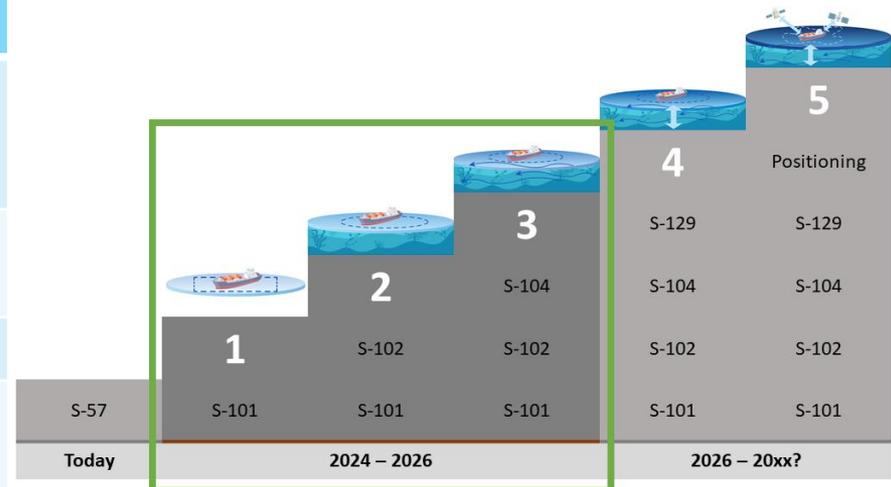
S-111 Surface Currents



# Baltic Sea e-Nav Interreg project 2023-2026



Goal	Period
Develop production capabilities for S-101 ENC, S-102 bathymetry and to some extent S-104 water level	2023-2025
Establish <b>harmonization rules</b> for S-10x-products, under the BSHC umbrella	2024-2026
<b>Test, evaluate and refine</b> the S-10x products	2025
<b>Commercial rollout</b> for S-101 and S-102 in the Baltic Sea. S-104 in parts of FI.	2026



# Baltic Sea e-Nav

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



# Baltic Sea e-Nav – Financing

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

**Interreg**  
Baltic Sea Region



Co-funded by  
the European Union



# Harmonization and validation issues

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



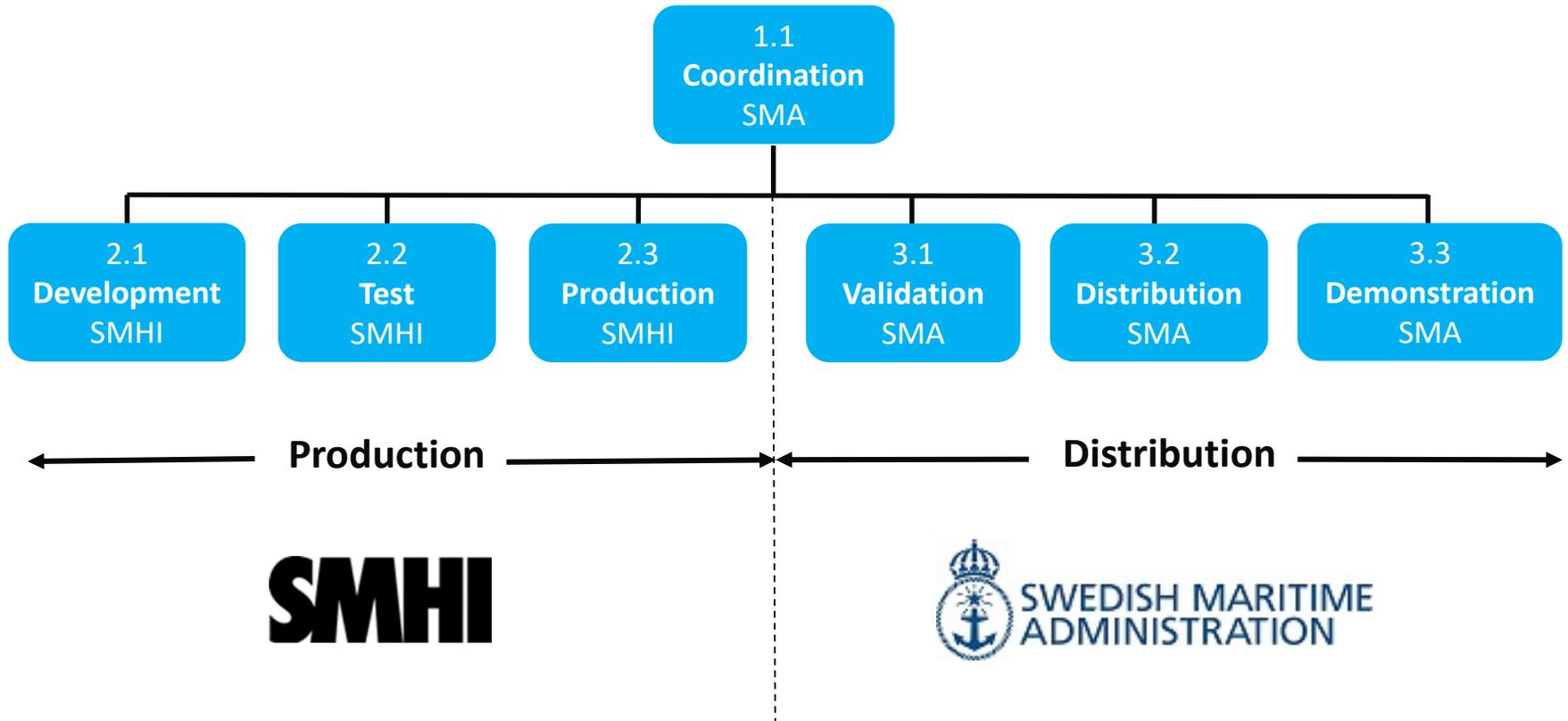
# S-100 Implementation Sweden

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

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

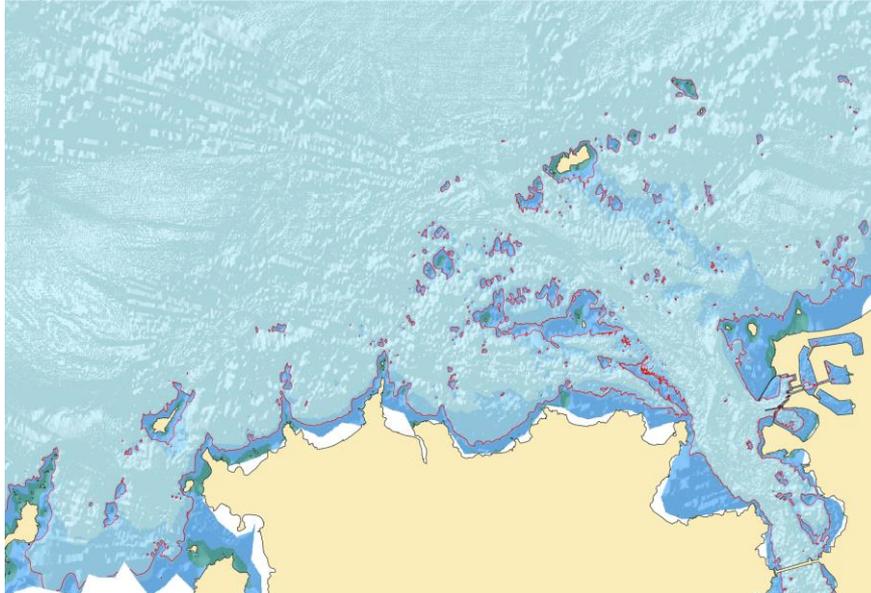


# S-104/S-111 Production Sweden

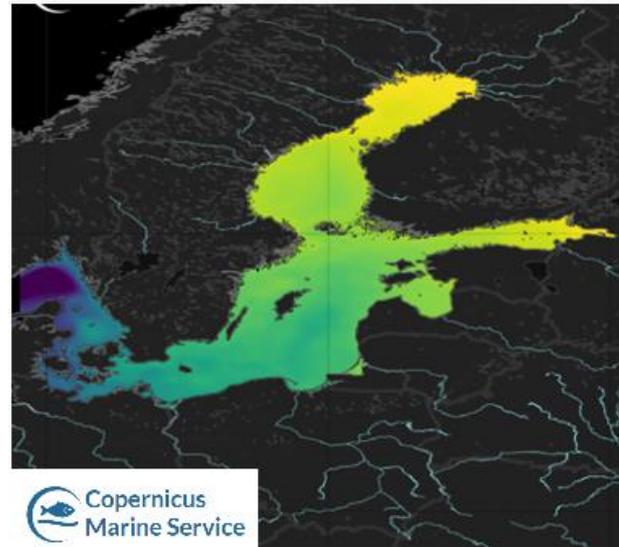


# S-104 Water Level

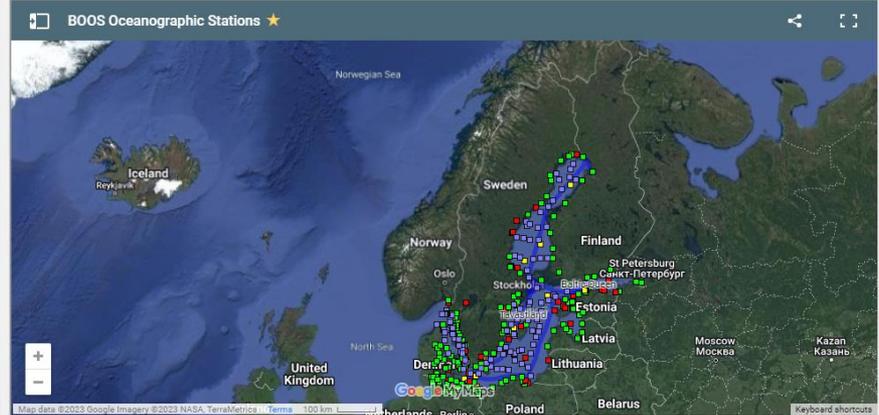
WATER LEVEL FROM S-102 COMBINED WITH S-104  
 Safety Contour : 7m  
 Time : 04/09/2021 00:00



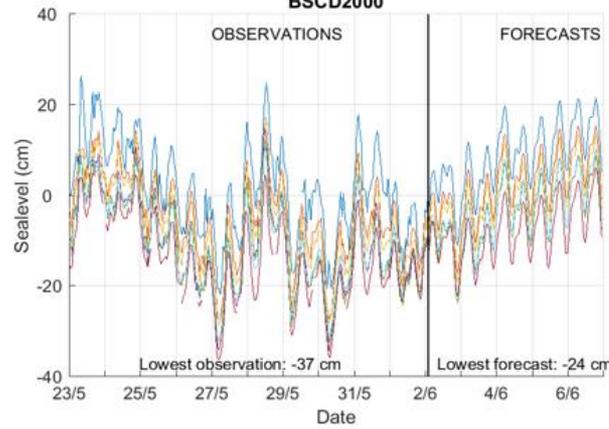
Sea surface height above geoid



BOOS > BOOS Stations  
**BOOS Stations**  
 EuroGOOS Baltic Regional Operational Oceanographic System

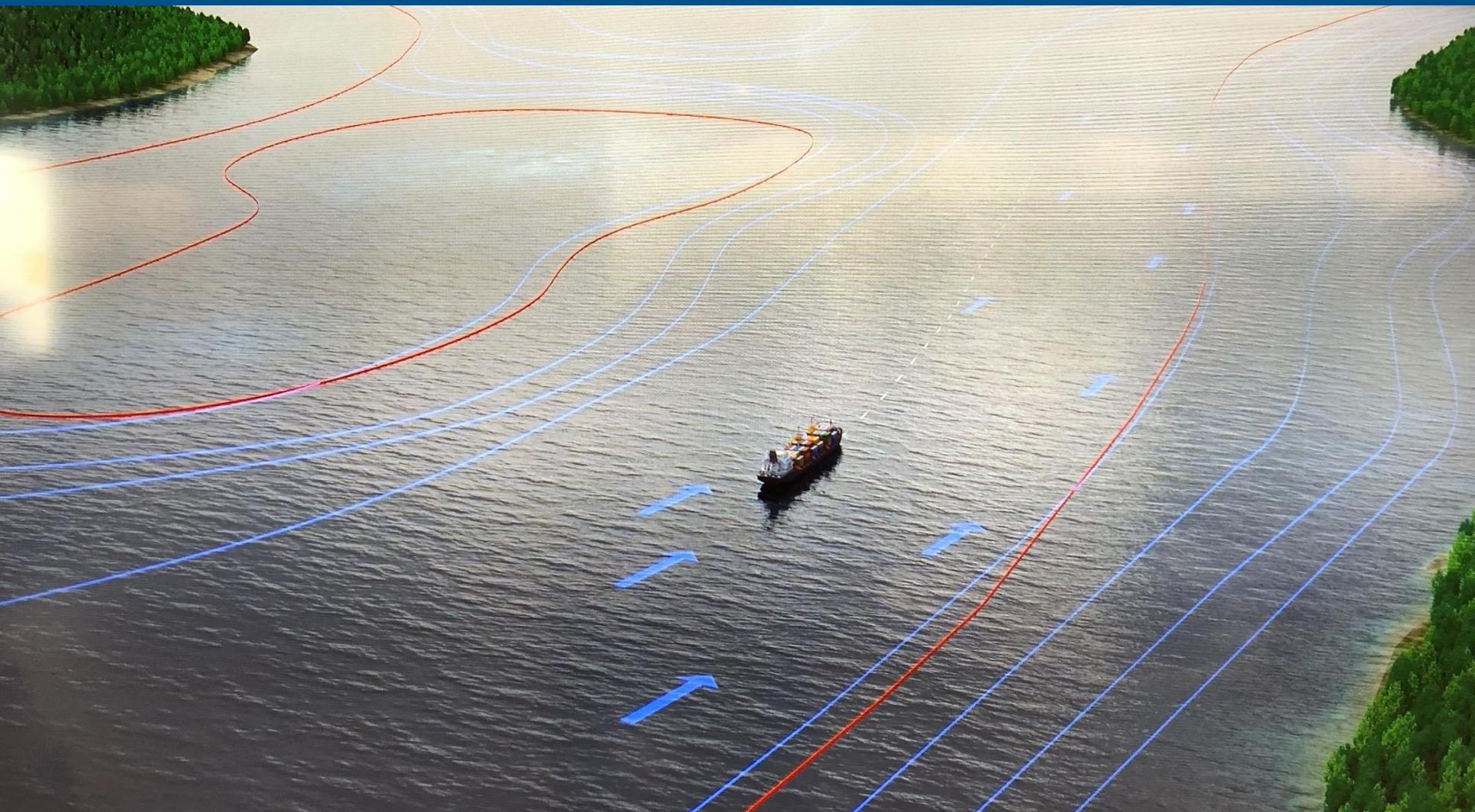


**Sealevels Göteborg**  
 2023-05-23 to 2023-06-06  
 Issued: 2023-06-02 02:00 UTC  
 BSCD2000





# Future navigation



# Thanks!



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