BSHC Chart Datum Working Group (CDWG)

CDWG Report to the BSHC 25th Conference

The CDWG TORs requests the CDWG to report annually to the BSHC.

1. Status of Work of CDWG since BSHC 24th Conference

Since the BSHC 23rd Conference, *Mr Thomas Hammarklint* has acted as a Chair. *Mr Jyrki Mononen* was elected as the ordinary secretary.

CDWG has supported the implementation of the Baltic Sea Chart Datum 2000 (BSCD2000), reviewed the progress of implementation, promoted development of a common geoid model for the Baltic Sea, and cooperated with relevant international bodies. The work has been presented at several national and international conferences.

In addition transition period road map and time line have been updated [CDWG Roadmap], BSHC CDWG – web pages [CDWG Website] were updated and maintained. A sketch of implementation process and connections has been drafted [CDWG12 Chairmans Report].

The communication within the CDWG has been done by e-mail correspondence and the CDWG12 meeting. The meeting was held on 3-4 March 2020 in Gdynia, Poland. 16 delegates attended the meeting.

All the BSHC countries have nominated members to the working group, however not all have been active or participated to the meetings. BOOS has nominated Point of Contact. Observers are nominated from Swedish National Land Survey, Swedish Meteorological and Hydrological Institute, Finnish Geodetic Institute, Finnish Meteorological Institute, Federal Agency for Cartography and Geodesy (Germany), and Norwegian Mapping Authority.

Members of CDWG:	Denmark	Mr Peter Ladegård Sørensen
	Estonia	Mrs Gabriela Kotsulim
	Finland	Mr Jyrki Mononen (Secretary)
	Finland	Mrs Janina Tapia Cotrino
	Germany	Dr Patrik Westfeld
	Latvia	Mr Bruno Špēls
	Lithuania	Mr Mindaugas Zakarauskas
	Poland	Mr Witold Stasiak
	Russia	Dr Sergey V. Reshetniak
	Sweden	Mr Thomas Hammarklint (Chair)
	Sweden	Mr Lars Jakobsson
	Sweden	Mr Henrik Tengbert

Observers:	Finland	Mrs Mirjam Bilker-Koivula
	Finland	Mrs Anni Montonen
	Sweden	Dr Jonas Ågren
	Sweden	Dr Per-Anders Olsson
	Sweden	Mr Mikael Stenström
	Norway	Mr Aksel Voldsund
	Germany	Dr Gunter Liebsch
	Germany	Dr Joachim Schwabe

Representative of BOOS: Sweden Mr Thomas Hammarklint

An updated List of Members and other documents can be found at the CDWG website.

2. CDWG 12th meeting 3-4 March 2020, Gdynia, Poland

The Chairman, Mr Thomas Hammarklint presented the Chairman's Report and concluded that progress has been made over the last year of the implementation of the Baltic Sea Chart Datum 2000. Good examples of implementation was shown from several Baltic countries. Minutes from the meeting.

One of the most important items in the meeting was to review national plans and status of implementation of the Baltic Sea Chart Datum 2000. The national implementation plans were reviewed by the participants. A questionnaire of national plans and status was done before the meeting to gather information from all the member states regardless participation in the meeting. Answers were given by all nine Baltic countries. It can be concluded that most member states have made actions to implement the common vertical datum, see the Summary of the Implementation Status.

A good geoid model for the whole Baltic Sea is an essential component for the Baltic Sea Chart Datum 2000. Gravity surveys are needed to cover the Baltic Sea area with sufficient data for the geoid model. The member states were committed to continue the EU co-financed FAMOS-projects (Finalising Surveys for the Baltic Motorways of the Sea), which includes gravity surveys and improvement of the geoid model for the Baltic Sea. However, the continuation project did not receive any funding and needs to be finalized without any finance. At the meeting, it was discussed how the work will be concluded until the end of 2022. Several actions on this matter have been listed in the CDWG12 Action list.

Other items were to plan the cooperation with BOOS in future, to review and update the TORs and the Work Programme (Annex 1 and 2) for the years 2020-2021 and plan the future work until 2023 of the CDWG [RoadMap].

3. Future Work of the CDWG

CDWG will continue to guide and follow up the progress of the implementation of the harmonised vertical reference. The updated List of Actions from CDWG12.

Further develop the "the specification for Baltic Sea Chart Datum 2000". Finalize the FAMOS Geoid model for the whole Baltic Sea, in cooperation with the FAMOS Data Owners. Promoting studies and further development of dynamic topography of sea surface and promote improving precise real-time GNSS navigation.

Continue cooperation with BOOS concerning water level information. Cooperation is important for the implementation and usage of the harmonised vertical reference. Continue communication with relevant organisations and inform users by giving presentations and participating in relevant conferences.

To activate all the member states to send representatives to the CDWG meetings.

The CDWG plans to have its next meeting (CDWG13), 27-28 April 2021 in Gothenburg, Sweden.

4. The results of the CDWG during 2019-2020

CDWG has promoted studies and development of a common geoid model for the Baltic Sea by supporting the FAMOS-projects. Within FAMOS-project several gravity-surveying campaigns were executed in the Baltic Sea during 2015-2018 and interim geoid models have been calculated during 2018.

The specification for the Baltic Sea Chart Datum 2000 have been finalized. The specification is an essential document for applying and realizing the Baltic Sea Chart Datum 2000 in all BSHC member states.

A news article about the CDWG work and the implementation of the Baltic Sea Chart Datum 2000 has been published in the IHO Review in May 2020.

In cooperation with BOOS partners, the CDWG have compiled a list of the mean sea level in the Baltic Sea Chart Datum 2000 at sea level stations located in the Baltic Sea (including Norway). The list can be downloaded from here. Also, the results are visualized in a map.

Presentations were given by CDWG members as planned in the communication plan in the following conferences in 2019, 2020 and 2021:

- BSHC CDWG11, Aalborg, Denmark, 5-6 February 2019
- TWCWG4/GLOSSGEXVI, Busan, Korea, 8-13 April 2019
- BOOS Annual Meeting, Rostock, Germany, 12-13 June 2019
- BSHC24, Gdansk, Poland, 10-12 September 2019
- NSHC TWG23, Reykjavik, Iceland, 5-6 February, 2020
- BSHC CDWG12, Gdynia, Poland, 3-4 March 2020
- NKG meeting, Reykjavik, Iceland, 10-11 March 2020
- BSHC25, Stockholm, Sweden, 22-24 September 2020
- BOOS annual meeting, Sopot, Poland, 4-6 November 2020
- TWCWG5, Stavanger, Norway, 19-23 April 2021
- BSHC CDWG13, Gothenburg, Sweden, 27-28 April 2021

The following decisions have been taken by the BSHC Conferences concerning the usage, naming and abbreviation of the Baltic Sea Chart Datum 2000:

- The following chart datum name should be shown in paper charts:
  Mean Sea Level (Baltic Sea Chart Datum 2000national realization name) or
  Mean Sea Level (Baltic Sea Chart Datum 2000)
- The attribute to specify the datum to which both vertical datum and sounding datum are referred in S-57 ENCs [link], should be the following: VERDAT = 3 (Mean sea level)
- When sufficient, the abbreviation of Baltic Sea Chart Datum 2000 should be used: BSCD2000
- BSCD2000 have been registered as chart datum 44 in IHO Geospatial Information (GI) Registry [link].

5. Actions for the BSHC 25th Conference

The BSHC 25th Conference is requested to:

1. note this report
2. endorse CDWG TORs 2020-2021 (*Annex 1*)
3. endorse CDWG Work Programme 2020-2021 (*Annex 2*)
4. give further guidance to CDWG, as seen appropriate

Annexes:

1. CDWG TORs 2020-2021
2. CDWG Work Programme 2020-2021

Annex 1: CDWG TORs 2020-2021

BSHC Chart Datum Working Group
Terms of Reference 2020-2021
4 March 2020

To be approved by the BSHC 25th Conference, 22-24 September 2020

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 FAMOS Geoid model

- to support geoid and oceanographic studies relevant to these purposes.

5. To cooperate with relevant international bodies, for example organizations responsible for delivering water level information (e.g. BOOS and NOOS) and geodetic infrastructure (e.g. EUREF and NKG).

6. To liaise with relevant IHO bodies and study relevant IHO resolutions and specifications.

Annex 2: CDWG Work Programme 2020-2021

BSHC Chart Datum Working Group
Work Programme 2020-2021
4 March 2020

To be approved by the BSHC 25th Conference, 22-24 September 2020

Note: This Work Programme includes those Tasks which were identified as the priority issues and which are expected to be fostered during 2020-2021 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 of S-104 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 other relevant institutes and organizations.

7. Support other IHO working groups and European projects in issues concerning vertical references.