



Questionnaire to BSHC Member States on their implementation status of the transition to a Harmonised Vertical Reference, Baltic Sea Chart Datum 2000 (BSCD2000).

Please return to Thomas Hammarklint by email (thomas.hammarklint@sjofartsverket.se) at the latest by **15 August 2021**.

Member state	Germany
Date of reply	12.08.2021
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1. Are all the decisions done to implement the Baltic Sea Chart Datum 2000?

1.1. When the decisions has been done or planned to be done?

In September 2016, Germany decided to introduce the new national height system DHHN2016 plus the quasi geoid model GCG2016. The official introduction was decreed in January 2018 and is binding for all institutions coming under the jurisdiction of the German Waterway and Shipping Administration.

The zero level of DHHN2016 is in accordance with Amsterdams Peil (NAP), the normal potential is defined by the Geodetic Reference System 1980 (GRS80). DHHN2016 thus corresponds to EVRS, except for a few centimetres. These deviations are far below the accuracy statements in the BSCD2000 definition paper and the uncertainty of the upcoming BSCD2000 quasigeoid model.

In accordance with the technical guideline, which specifies the requirements for the implementation of legal measures from the Federal Georeference Data Act (Bundesgeoreferenzdatengesetz), the nautical sea chart datum for the Baltic Sea is equivalent to the German height system. The introduction of the designation "BSCD2000 (realized by ETRS89/DHHN2016)" as chart datum for the German Baltic Sea is thus the next logical step.

In August 2021, BSCD2000 was officially introduced as chart datum for German waters in the Baltic Sea.

1.2. What are the national decisive organizations?

Federal Maritime and Hydrographic Agency (BSH)

2. What is the national status of implementation of chart datum?

2.1. What actions have already been done?

The German national reference frame is in accordance with BSCD2000 specifications of the Baltic Sea Chart Datum 2000. Thus, in Germany BSCD2000 is realized by ETRS89/DREF91/2016 and DHHN2016.



2.2. What actions have been planned to be executed and what is the schedule?

Next, the designation BSCD2000 must be considered when producing BSH nautical charts. For paper charts, this is scheduled for the next edition of INT charts, co-published with UKHO. The procedure for S-57 ENC production remains unaffected (VERDAT=3; see 2.4).

2.3 Which ENC Approach have been updated with the new reference datum? If possible, attach a chart datum overview covering Your countries nautical charts, designed graphically or as a table, updated around January, 2021. Also, if possible, include an attribute to each named chart describing the CD difference to BSCD2000 in cm (CD minus BSCD2000). Example attached at the end of the Questionnaire (Annex).

There is no need to update an ENC approach because the CD realization has not been changed.

2.4 If you implemented the attribute VERDAT in S-57 (ENC), are You using VERDAT=3 (Mean Sea Level)?

Yes.

3. Has Your country established the national realization of EVRS and are the water level stations connected to this new height system (BSCD2000)?

3.1 Which organization/-s is responsible for the water level stations/data in Your country?

Federal Waterways and Shipping Administration (WSV)

3.2 Which reference are used today to present water level information? Does Your country planning to present water level information referring to BSCD2000? Doing it already today? Date decided for change the reference to BSCD2000?

Water level information are provided with respect to DHHN2016 (gauge zero point), and thus with respect to BSCD2000 (see 1.1 and 2.1).

3.3 Are there any plans for digital service/-s intended for the users to have the option to choose MSL or BSCD2000 as the reference level for water level information?

Not at the moment.

3.4 GNSS supported UKC control/confirmation is probably the reality in a few years. We also need reliable water level predictions for carrying out optimal loading and real time water level data to check the GNSS data. Do we need a shared service in the Baltic Sea for water level information (predictions/real-time), which fulfils nautical needs and demands?

Yes.



3.5 Do we need to work together with the development of the IHO S-104 standard?

Yes, if there is consensus on 3.4.

4. Are the relevant national contacts and interest groups defined for the change of chart datum and water level reference?

4.1. What are the essential national interest groups in Your country?

From user side, all operators using (hydrographic) survey data. From administrative side, primarily the Federal Maritime and Hydrographic Agency (BSH), and partly the German Waterway and Shipping Administration (GDWS) and the German Federal Institute of Hydrology (BfG).

4.2. Are the relevant point of contacts known and contacts been made to them?

Yes.

4.3 Are You planning any information campaign about the change of chart datum and water level reference? If, yes have you published information about this somewhere?

No because CD realization did not change.

5. Have You identified any obstacles or major issues concerning transition to the harmonized vertical reference?

No.

6. Connections to neighbouring countries

6.1. Which are the relevant countries to cooperate?

Denmark, Sweden, Poland

6.2. Are the needed points of contacts already known?

Yes.

6.3. What actions have been agreed with the relevant countries (e.g. synchronising plans and schedules)?

Synchronised measurement campaigns and R&D knowledge exchange.

7. Are there any needs for support from BSHC?

No.



8. Do you have any other proposals or guidance to the CDWG to help and foster the transition process?

One remark from Federal Agency for Cartography and Geodesy (BKG) regarding the finalization of the FAMOS/BSCD2000 geoid:

It is assumed that most countries have an interest that the BSCD2000 geoid reproduces the national geoid models (as long as they comply with BSCD2000, i.e., correspond to ETRS89/EVRS) as far as possible (i.e., apart the transition to the best geoid from the FAMOS project along the coast and to neighbouring countries, and grid resampling effects).

The according blending approaches, which are under development, require that the national geoid models cover at least some buffer zone around the national land territories. For most countries this is the case. However, in case of Poland (geoid2011-PL-EVRF2007-NH) and Latvia (LV'14), the national geoid models are cut out very tightly (~3-4 km), so that no real transition zone remains to blend, resulting in step artefacts along the coast and national borders.

The simple solution would be that the geodetic authorities of Poland and Latvia provide unmasked versions of the models. The CDWG might support this claim by pointing out the importance of a BSCD2000 geoid that is "clean" and in agreement with the national geoid models along the coast (land borders are probably not that important to the mariners).

9. Are you using GNSS and GNSS augmentation services for referring to your (bathymetric) surveys to the chart datum?

9.1 What GNSS augmentation service is used for hydrographic surveys? (If there are several augmentation services, list all of them.)

SAPOS satellite positioning service of the German land survey authorities and commercial PPP services.

9.2 To which coordinate system, and vertical reference level/frame the GNSS augmentation service is referred to? (If there are several systems in use, list all of them.)

ETRS89/DREF91/2016 and DHHN2016

9.3 Does your HO require, in-house or procured, that Hydrographic survey system shall be prepared to be able to measuring the GNSS-height and refer the depth to the geoid?

At BSH, depths measured refer to the geoid. Depending on the application/product, physical heights are transformed later in the course of the data processing chain to water level dependent values (e.g. LAT transformation for North Sea chart production).

9.4 Do you discuss within your HO the need of an altimetric measured Mean Sea Surface (MSS)? (For example, in order to support hydrodynamic models, shipping and / or adjust existing depth data)?

Yes, partly.



9.5 Has your HO assessed the need for dynamic geodetic reference systems (time-dependent transformation relationship) between primarily national and global reference frames?

No.