

BSHC Chart Datum Working Group

Report to the BSHC 13th Conference

[8 August 2008]

The BSHC 12th Conference established to **Chart Datum Working Group** with the TORs in Annex 1 to study the possibilities and plans to move to a common vertical reference system in Baltic Sea countries.

1. Status of Work of Chart Datum Working Group

The ChartDatumWG Membership is in Annex 2.

The ChartDatumWG has developed and approved its Work Programme as in Annex 3. The ChartDatumWG has worked according to the Work programme. The Chair has sent four ChartDatumWG Letters asking for information on current situation and proposals for further work. Main contribution to the work has been from Denmark, Estonia, Finland, Germany, Poland and Sweden.

In addition to the original work plan, a representative from Finland (*Mr. Jyrki Mononen*) presented a paper in FIG Working Week in Stockholm in June 2008. The aim of this paper was to describe the need of nautical chart datum harmonization and some details of the work of BSHC for this to professionals in surveying.

2. Brief conclusions of the current situation

A brief summary of the status of vertical datums and plans to move into a common one is in Annex 4. The Chairman sent also a brief analysis of the existing differences between datums in February. This analysis was based on predictions and assumptions in many details, but positive comments were received about details which should be studied and clarified. However one may draw conclusions that

- the existing chart datums deviate from the true MSL less than 10 cm:s in most cases. (True MSL is a long-period statistic measure which is affected by several physical effects; the land uplift on the Gulf of Bothnia area maybe has the most serious local effect to be taken into account.)
- the differences between the neighbouring countries may be even larger. Finland and Estonia have a long common maritime borderline and the coastlines are close to each others. Theoretically the difference seem to be close to 5 cm:s, but in practice larger differences have been observed.

Based on the information gathered it seems that there is a good possibility and willingness to harmonise the Baltic Sea datums (which are in line with EVRF2000) in the near future.

However, it seems that still more studies are needed to clarify the details of the existing datums and the difference between them. The Baltic Levelling Ring (BLR) adjustment, which has the NAP (European height zero) origin, seems to be the only feasible basis.

Also new issues have appeared to be studied in more depths, e.g. water level information and their predictions and interpolations and passing real time water level information to users.

The future work of the WG shall be divided to three successive phases.

Phase 1: Detailed analysis of the existing chart and geodetic datums and accurate estimates of the differences between them.

Phase 2: The present survey, chart production and water level information processed shall be studied in order to determine uniform processes for presentation and publishing depth and water level information for mariners, other users and also for our bi-lateral data exchange.

Phase 3: The final phase is the adoption of the common geodetic chart datum for the whole Baltic Sea. This would be the most convenient solution for mariners and other users of the hydrographic data, but have to be prepared that this will take some time and lots of efforts by us.

3. Proposals for further actions to Chart Datum Working Group

The Chair proposes the following actions to proceed in this issue:

Immediately:

- All to agree that Baltic Levelling Ring (BLR) (or its improved version in the future) is the common reference for comparisons between the existing chart datums and for determining the height of the existing chart datum from the well known and well defined reference frame.

For Phase 1:

- All to define differences between their national datums and BLR.
- All to specify the relations of the earlier survey data and datums of the present charts to national datum and/or BLR. The differences should be analyzed in terms of accuracy and reliability.
- Especially Finland and Sweden (with a long coastline and the effect of land uplift) to study and describe their national datums in more details.
- Chair to collect a database (file) on these differences.

For Phase 1 and simultaneously also for Phase 2:

- All to specify which mareographs and possibly other equipment and methods are used for water level observations for hydrographic surveys and for information to mariners. Special attention have to be put on ensuring that the height of the index of the measuring equipment is always measured and maintained in reference to common geodetic frame and chart datum. This is valid for all the existing and future systems and should be studied also for equipments which have been used in earlier surveys, which are still used in chart production.

A ChartDatumWG meeting is proposed to be held in early 2009 to analyse on common understanding of the situation and to agree on future actions. Finland is willing to host that ChartDatumWG meeting. Marine research or other relevant institutes (e.g. in Finland: Finnish Marine Research Institute, Finnish Geodetic Institute) may be invited as experts to the meeting.

4. Proposed revised TORs for the ChartDatumWG

In order to follow the above actions, there are in Annex 5 a proposed revised TORs for the ChartDatumWG. These contain the main revised or new issues dealing with water level information and their predictions and interpolations.

5. Actions for the BSHC 13th Conference:

The BSHC 13th Conference is requested to

1. endorse this Report
2. approve the proposed further actions
3. approve the revised TORs for the ChartDatumWG



Jukka Varonen,
Chairman of the ChartDatumWG

Annexes:

1. TORs for the ChartDatumWG (approved at BSHC 12th Conference on 12 June 2007)
 2. ChartDatumWG Membership
 3. ChartDatumWG Work Program
 4. Brief status summary of the vertical datums on BSHC countries
 5. Proposed revised TORs for the ChartDatumWG
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Terms of Reference

for BSHC Working Group for the Harmonization of the Chart Datums of the Baltic Sea

[Approved by the BSHC 12th Conference 12-14 June 2007]

The Working Group should

- **to study the feasibility to use the European geodetic height reference system as a principal alternative for a harmonised vertical reference system for Baltic Sea nautical charts.**
- **to study possible time schedules and necessary preconditions with each of the Baltic Sea countries could move to use this harmonised datum on their nautical charts.**
- **to study and to develop recommended principles how the transfer period will be implemented** (also in the case if one or more countries are not joining to a common reference).
- **to prepare recommendations how the sea level and its variations should be shown on nautical paper and ENC charts and publications** [ref. IHO T.R. A2.5.2. note ii].

In addition, the Working Group should

- **to prepare an introductory presentation of existing geodetic height datums which cover all countries around the Baltic Sea**
- **to specify the existing differences of chart datums used in the Baltic Sea area**
- **to clarify the role of other international bodies on this subject and find out point of contacts to them**

The Working Group should report to the BSHC 13th Conference.

**BSHC Working Group
for
the Harmonization of the Chart Datums
of the Baltic Sea**

(By 19 December 2007)

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¹ Chairman of the ChartDatumWG

² Secretary of the ChartDatumWG

Finnish Maritime Administration
Hydrographic Department
Jukka varonen/Juha Korhonen
28 June 2007

The BSHC Working Group for the Harmonization of the Chart Datums of the Baltic Sea

Work Programme Draft Version 0.1:

Priorities: *High, Medium, Low*

Status: *Planned, Ongoing, Completed*

Task	Work Item	Respon- sibility	Priority	Start date	End Date	Status	Actions/Remarks
1. Feasibility to use the European geodetic height reference system							
T.1.1	Study the current situation and plans in each country	Chair/ Estonia?	<i>High</i>	<i>8/2007</i>		<i>Planned</i>	
T.1.2							
T.1.3							
2. Time schedules and necessary preconditions							
T.2.1	Study the time schedules on each country	Chair/ Estonia?	<i>High</i>	<i>8/2007</i>		<i>Planned</i>	
T.2.2	Study the necessary preconditions in each country	Chair	<i>High</i>	<i>8/2007</i>		<i>Planned</i>	
T.2.3	Make an overview report of the current situation and plans	Chair	<i>High</i>			<i>Planned</i>	
3. Study recommended principles how the transfer period							
T.3.1	Evaluate feasible principles for the transfer period		<i>Medium</i>			<i>Planned</i>	
T.3.2							

Task	Work Item	Responsibility	Priority	Start date	End Date	Status	Actions/Remarks
4. Develop recommendations how the sea level and its variations should be shown on nautical paper and ENC charts and publications							
T.4.1	Study the current practices for paper and ENC charts and nautical publications		<i>Medium</i>			<i>Planned</i>	
T.4.2	Develop recommendations for the future		<i>Medium</i>			<i>Planned</i>	
5. Prepare an introductory presentation of existing geodetic height datums							
T.5.1.	Prepare a presentation based on the results of the Task T.2.3		<i>Medium</i>			<i>Planned</i>	
6. Specify the existing differences of chart datums							
T.6.1	Prepare a list based on the results of the Task 2.3.		<i>High</i>			<i>Planned</i>	
7. Clarify the role of other international bodies							
T.7.1	Evaluate relevant international bodies	Estonia?	<i>Medium</i>			<i>Planned</i>	
T.7.2	Prepare a clarification document for the roles of international bodies		<i>Medium</i>			<i>Planned</i>	
T.7.3	To refer to the Tidal Committee an issue of methods and equipment for distribution of real time sea level data (to the Mariners, AIS, VTS, etc.)	Chair	<i>Medium</i>		BSHC13 (Autumn 2008)	<i>Planned</i>	BSHC12 Action7.
T.7.4	To provide the members of BSHC with a report on activities providing real time sea level data for mariners and VTS or other authorities.	Chair	<i>Medium</i>		12/2007	<i>Planned</i>	BSHC12 Action8.

Finnish Maritime Administration
Hydrographic Department
Juha Korhonen
8 August 2008

Draft Summary Table of the Analysis of the Questionnaire on October 2007

	Q#1	Q#2	Q#3	Q#4	Q#5	Q#6	Q#7	Q#8	Q#9	Q#10	Q#11
	Current HO Datums	Others organisations Datums	How datum is Specified	Known differerences?	Contacts to other oranisations	Future Plans	Change datum?	Time estimati ons	Practice on charts (P) and ENC's (E)	Pre-conditions	Other information
Denmark	DVR90	Same	Well	Yes	FRV, KDI, KMS,	MSL	No	No	P: MSL E: MSL	?	
Estonia	BHS-77	Same	No docum.	Yes	ELB, MSI/TUT	Support harmon.	Yes	????	P: MSL E: MSL	None	
Finland	MSL	NN,N60, N2000	Well	Estim.	FGI, FIMR, NBLs	Yes	Yes	>2010	P: MSL E: MSL	None	
Germany	NN, MSL, HN-14, GDR	NN, NH	Well	Yes	FWSA, BKG,	NHN	Yes	2008/9	P: MSL E: MSL	Manda-tory	Question on Datums in S-57
Latvia											
Lithuania											
Poland	NN, MSL	Same	?	Yes	IMWM	EUREF	Yes	2010	P: MSL E: MSL	-	
Russia											
Sweden	MSL	RH70, RH2000	Well	No	LS, SMHI,	MSL2000	Yes	New charts	P: MSL E: MSL	See text	

General observations:

- There are in use many datums today. Most of them are well defined. Contacts to other relevant organisations do exist.
 - The differences between the neighbouring datums are known almost by all.
 - No major obstacles or preconditions to change the datum were reported.
 - There is a good possibility and willingness to harmonise the Baltic Sea datums in the near future. Denmark has already a datum, which is very close to the EVRF2000.
 - The CartDatumWG needs to clarify many details and find out practical roadmap and time schedule for this transition.
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[Proposed revised]

Terms of Reference

for BSHC Working Group for the Harmonization of the Chart Datums of the Baltic Sea

[to be Approved by the BSHC 13th Conference 19-21 August 2008]

The Working Group should

- to study the feasibility to use the European geodetic height reference system as a principal alternative for a harmonised vertical reference system for Baltic Sea nautical charts,
- to specify the existing differences of chart datums used in the Baltic Sea area, **especially**
 - o possible inconsistency in the nations area
 - o differences across the borders of the neighbouring countries
 - o differences compared to the common geodetic height datum
- to study
 - o the status of water level information
 - o distribution of water level information
 - o interpolation and prediction of water levels
- to prepare recommendations 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 T.R. A2.5.2. note ii].
- to study possible time schedules and necessary preconditions with each of the Baltic Sea countries could move to use this harmonised datum on their nautical charts.
- to study and to develop recommended principles how the transfer period **will be implemented** (also in the case if one or more countries are not joining to a common reference).

In addition, the Working Group should

- to prepare an introductory presentation of existing geodetic height datums which cover all countries around the Baltic Sea
- to clarify the role of other international bodies on this subject and find out point of contacts to them

The Working Group should report to the BSHC 14th Conference.
