TWCWG2, 8-12 May 2017
National Report of Finland

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Summary of contents

- Baltic Sea Hydrographic Commission: harmonized vertical datum, Baltic Sea Chart Datum 2000
- Definition and realization of the Baltic Sea Chart Datum 2000
- Finland: transition to the Baltic Sea Chart Datum 2000 (Finnish realization: N2000-height system)
- Finland: transformtion parameters ITRF -> ETRF (EUREF-FIN)

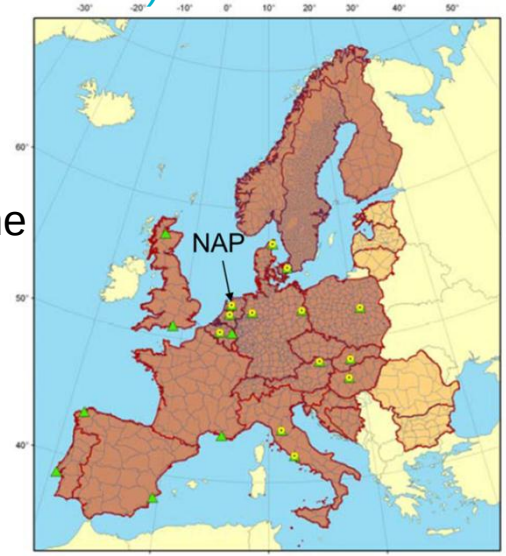
IHO / Baltic Sea Hydrographic Commission / Chart Datum WG: Harmonization of vertical datums

News from BSHC / CDWG

Image by BSHC

- A harmonized vertical datum for the Baltic Sea
- IHO Baltic Sea Hydrographic Commission (BSHC) has decided to harmonize vertical datums in the Baltic Sea nautical charts and navigational publications
- The harmonized vertical datum is based on EVRS (European Vertical reference System)
- MSL-based datums to well defined geodetic datum (IHO res 3/1919)
- It will be realized by national height systems (in Finland N2000-height system)
- National realizations agrees with each other within few cm
- BSHC has approved the name: Baltic Sea Chart Datum 2000
- BSHC Chart Datum WG (CDWG) has made a specification for the Baltic Sea Char Datum 2000 (draft-version)

EVRS (Jonas Ågren et al: GGHS2016 presentation)



- EVRS is defined using the following four conventions,
  - The vertical datum is defined as the equipotential surface in the level of the Normaal Amsterdams Peil (NAP).
  - The unit of length is meter (SI) and unit of time is second (SI).
  - The height component is specified by normal heights, or equivalently by geopotential numbers.
  - The zero permanent tide system is used.
- Postglacial land uplift epoch is not included as part of the EVRS definition.
- The last pan-European realisation of EVRS is EVRF2007, which has the land uplift epoch 2000.0 (computed using the land uplift model NKG2005LU).

EVRS (Jonas Ågren et al: GGHS2016 presentation)

National height reference frames around the Baltic Sea (on land)

- The modern national height reference frames in Sweden, Norway, Finland, Lithuania and Latvia have all been realised according to this EVRS definition (soon also Estonia), but in a little bit different ways.
- For all of the realisations mentioned above, the influence of the postglacial land uplift has been reduced to the common epoch 2000.0 by the land uplift model NKG2005LU. (Latvia to 2000.5)
- The new German height reference frame DHHN2016 is not a strict realisation of EVRS; it uses the mean permanent tide system, but agrees within a few cm from EVRF2007.
- The same is true for Denmark, where DVR90 is defined differently, but nevertheless agree very well with EVRF2007.

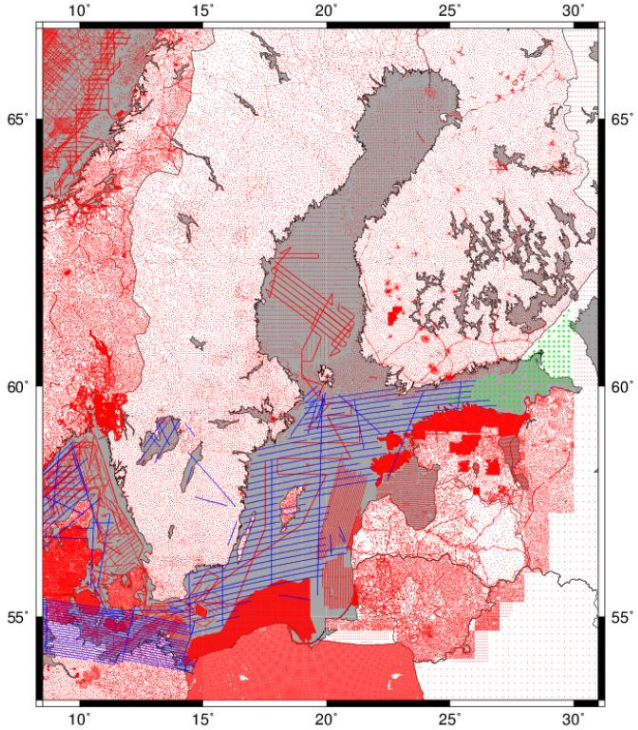
Specification of the Baltic Sea Chart Datum 2000

- Includes sections:
  - Definition
  - Realization
  - Comments and remarks
  - References
  - Figures
- Definition describes the conventions the Baltic Chart Datum 2000 is based on
- Realization describes the principles of the national realizations shall follow, what is the uncertainty level to be achieved, guidelines for use of GNSS-augmentation services
- National realization should
  - follow the definition strictly or
  - agree within a few cm from the official pan-European EVRS realisation with epoch 2000.0 (now EVRF2007).

Specification (continues)

- Land uplift epoch 2000.0 (important especially in northern part of the Baltic Sea)
- Land uplift corrections shall be applied in areas with significant land uplift
- The goal for the geodetic infrastructure for realization is to provide standard uncertainty better than 5 cm the whole Baltic Sea
  - ⇒What is needed? Good geoid model covering the Baltic Sea
  - ⇒ EU co-financed (INEA CEF-TRANSPORT) FAMOS project includes shipborne gravimetry surveys and geoid calculations
  - ⇒ interim geoid models calculated

FAMOS geoid model observations



Joachim Schwabe and Jonas Ågren, 2017-02-21: FAMOS Activty 2: Initial validaton of geoid models in the Baltic Sea.

The gravity observations used for FAMOS geoid are plotted in the figure. Red dots and tracks are terrestrial and marine data. Blue dots are airborne data. Green dots are “pseudo observations” generated by the satellite-only model.

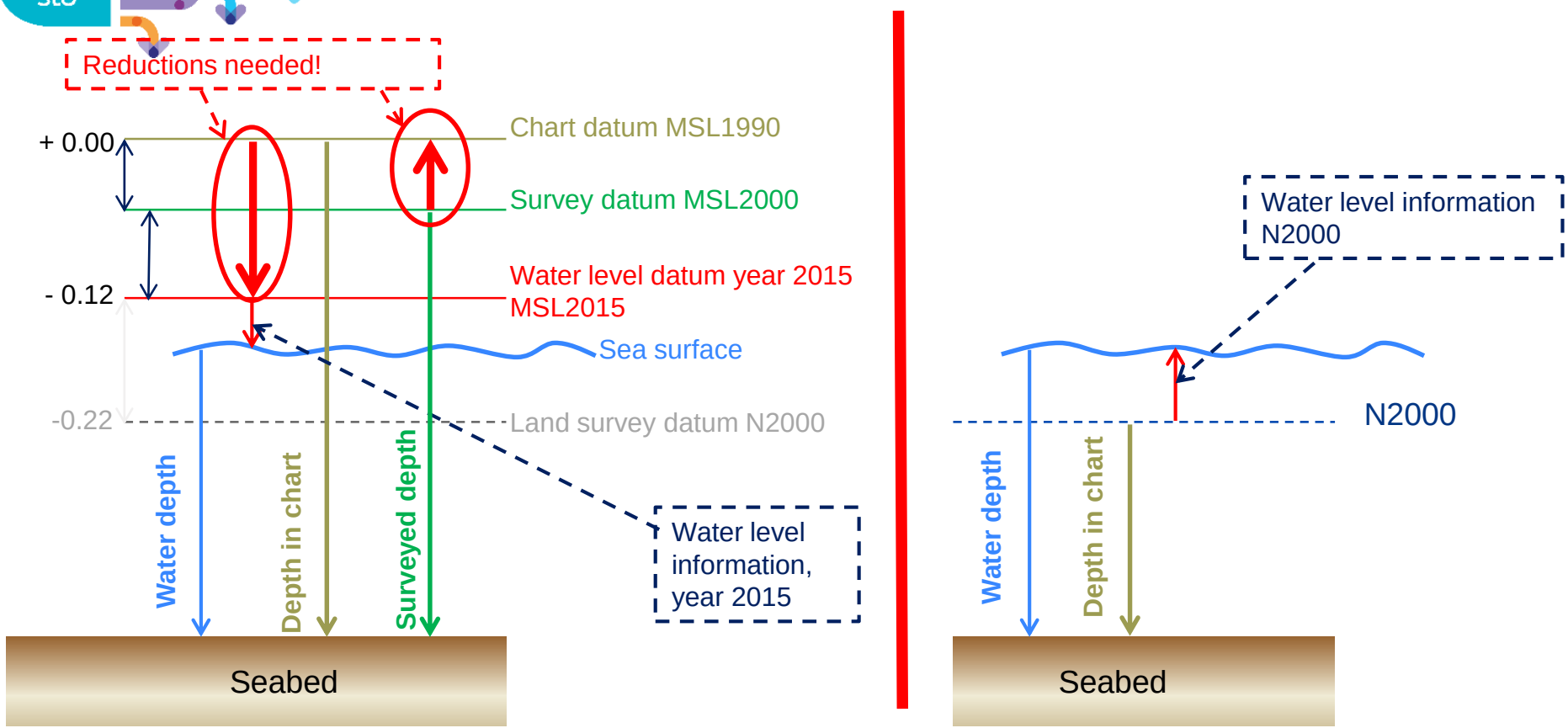
FAMOS
FINALISING SURVEYS FOR THE BALTIC MOTORWAYS OF THE SEA

Finland

Finland

- Decided to start transition to the Baltic Sea Chart Datum 2000
  - Project start-up meeting 2 March 2017
- Feasibility study 2015-2016
- Test chart spring 2017
  - Test transformation procedures, technical tools and to estimate needed recourses (manpower and financial) and time for transition
  - Estimate project timeframe and needed recourses
- Hydrographic surveys refers to N2000 after 2013
- Some lake-charts already referred to N2000
- Mareographs has been connected to N2000-height system

Before and after the harmonization



Finland: other relevant matters

- Renewal of bathymetric information system
- Renewal of chart production system
- Transformation parameters for horizontal coordinates from ITRF to ETRF (EUREF-FIN)
  - To be applied in Finnish territorial waters
  - Updates to parameters within every year or every ? years
  - Defined as 7-parameter similarity transformation between two sets of coordinates (Jivall, L. (2013): Simplified transformations from ITRF2008/IGS08 to ETRS89 for maritime applications. Lantmäteriet.)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Thank You!