5th Meeting of the Tides Water level and Currents Working Group

Guidelines and recommendations for HOs to allocate CATZOC values

Informative paper by the Data Quality Working Group

Agenda Item 5.5

TWCWG5, VTC Event, 16 - 18 March 2021

DQWG TERMS OF REFERENCE

1. Objective: to ensure that the data quality aspects are addressed in an appropriate and harmonized way for all S-100 based product specifications.

2. Should:
- develop/maintain DQ checklist.
- review S-100 based PS for DQ aspects.
- monitor international standards (ISO-19157).
- provide guidance to HOs on DQ aspects.
- provide educational material (S-67).
- review methodology to display quality information.
- propose new topics (e.g. autonomous shipping).

TWCWG5, VTC Event, 16 - 18 March 2021

RELATED DOCUMENTS / STANDARDS

1. S-4 Edition 4.8.0

2. S-44 Edition 6.0.0

3. S-57 Appendix B.1, Annex A (UOC) Ed.4.2.0

4. S-67 Edition 1.0.0

5. S-101 Data Classification Encoding Guide Ed.1.0.1

6. S-102 Edition 2.0

7. B-12 Guidance on Crowdsourced Bathymetry

8. C-51 Manual of Technical Aspects on Law of the Sea

9. INSPIRE D2.8.II.1 Data Specification on Elevation

FROM PING TO CHART (SURVEY TO CATZOC)

1. Data capture, associated accuracy (S-44).

2. Data storage (vector format S-57 or S-101).

3. Data storage (grid format S-102).

4. Data quality measures and recommended target results.

5. Assigning appropriate CATZOC values.

6. Added value of CSB data.

Positioning is a fundamental part for every survey operation. The hydrographer must consider the geodetic reference frame, horizontal and vertical reference systems, their connections to other systems in use (e.g. land survey datums), as well as the uncertainty inherent within associated measurements.

(ref S-44 Chapter 2)

HORIZONTAL REFERENCE SYSTEM

If horizontal positions are referenced to a local datum, the name and epoch of the datum should be specified and the datum should be tied to a realisation of a global (e.g. ITRF2018, WGS84(G1762)) or a regional (e.g. ETRS89, NAD83) reference frame and their later iterations. Transformations between reference frames/epochs should be taken into account, especially for surveys with low uncertainty (very accurate GNSS positioning).

(ref S-44 par 2.3)

VERTICAL REFERENCE SYSTEM

If the vertical component of the positions is referenced to a local vertical datum, the name and epoch of the datum should be specified. The vertical component of the positions (e.g. depths, drying heights) should be referenced to a vertical reference frame that is suitable for the data type and intended use. This vertical reference frame may be based on tidal observations (e.g. LAT, MWL, etc.), on a physical model (i.e. geoid) or a reference ellipsoid.

(ref S-44 par 2.4)

CHART AND LAND SURVEY VERTICAL DATUM CONNECTIONS (S-44)

International
Hydrographic
Organization

In order for bathymetric data to be correctly and fully utilised, chart and land survey vertical datum connections or relationships must be clearly determined and described. The IHO Resolution on Datums and Benchmarks, Resolution 3/1919, as amended, resolves practices which, where applicable, should be followed in the determination of these vertical datum connections. This essential resolution 3/1919, as amended, is available in the IHO Publication M-3.

Over the past 200 years, different countries have adopted different methods for computing chart datum, depending usually on the type of prevailing tide. In accordance with an IHO Resolution of 1926, chart datum should:

- Be so low that the water will but seldom fall below it.
- Not be so low as to cause the charted depths to be unrealistically deep.
- Very only gradually from area to area and from chart to chart to adjoining chart, to avoid significant discontinuities.
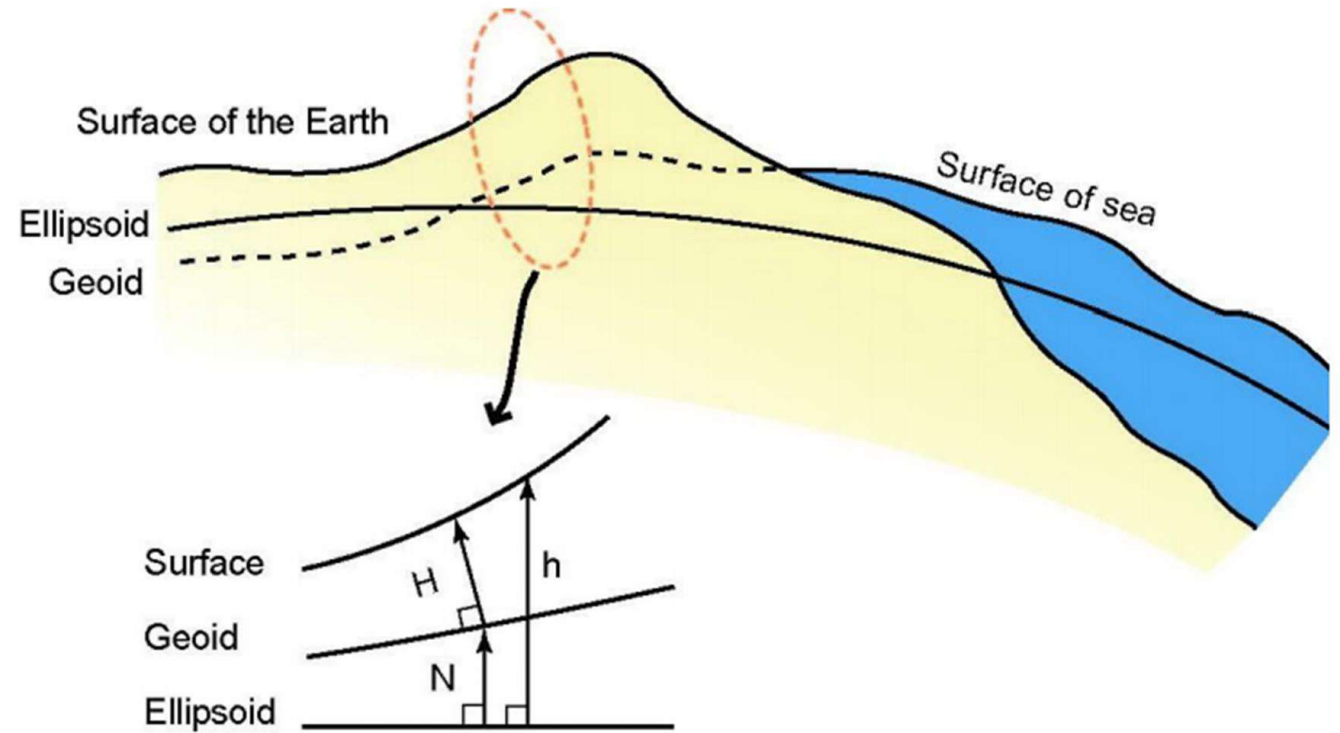
What is the vertical accuracy of:
1. ellipsoid - geoid
2. ellipsoid - chart datum

What is the accuracy of the vertical component of the Coordinate Reference System in use on land/at sea?

IHO

International Hydrographic Organization

1. CSBWG requested DQWG to investigate in DQ parameters and indicators for use by HOs and provide further guidance (ref DQWG16-02.6A).
2. CSB data is not corrected to the vertical datum used in the nautical chart (no tidal correction).
3. There is a lot of CSB data (60.000 SOLAS vessels, 130.000 private yachts).
4. Usage of trusted nodes to the DCDB (first quality check).

ACCURACY OF SOUNDINGS IN OFFICIAL NAUTICAL CHARTS

CATZOC	A1		A2		B		C		D	
depth	HOR	VRT	HOR	VRT	HOR	VRT	HOR	VRT	HOR	VRT
0	5.0 m	0.5 m		1.0 m		1.0 m		2.0 m		> 2.0 m
10	5.5 m	0.6 m		1.2 m		1.2 m		2.5 m		> 2.5 m
20	6.0 m	0.7 m		1.4 m		1.4 m		3.0 m		> 3.0 m
30	6.5 m	0.8 m		1.6 m		1.6 m		3.5 m		> 3.5 m
40	7.0 m	0.9 m	20 m	1.8 m	50 m	1.8 m	500 m	4.0 m	> 500m	> 4.0 m
50	7.5 m	1.0 m		2.0 m		2.0 m		4.5 m		> 4.5 m
75	8.8 m	1.3 m		2.5 m		2.5 m		5.8 m		> 5.8 m
100	10.0 m	1.5 m		3.0 m		3.0 m		7.0 m		> 7.0 m

TWCWG5, VTC Event, 16 - 18 March 2021

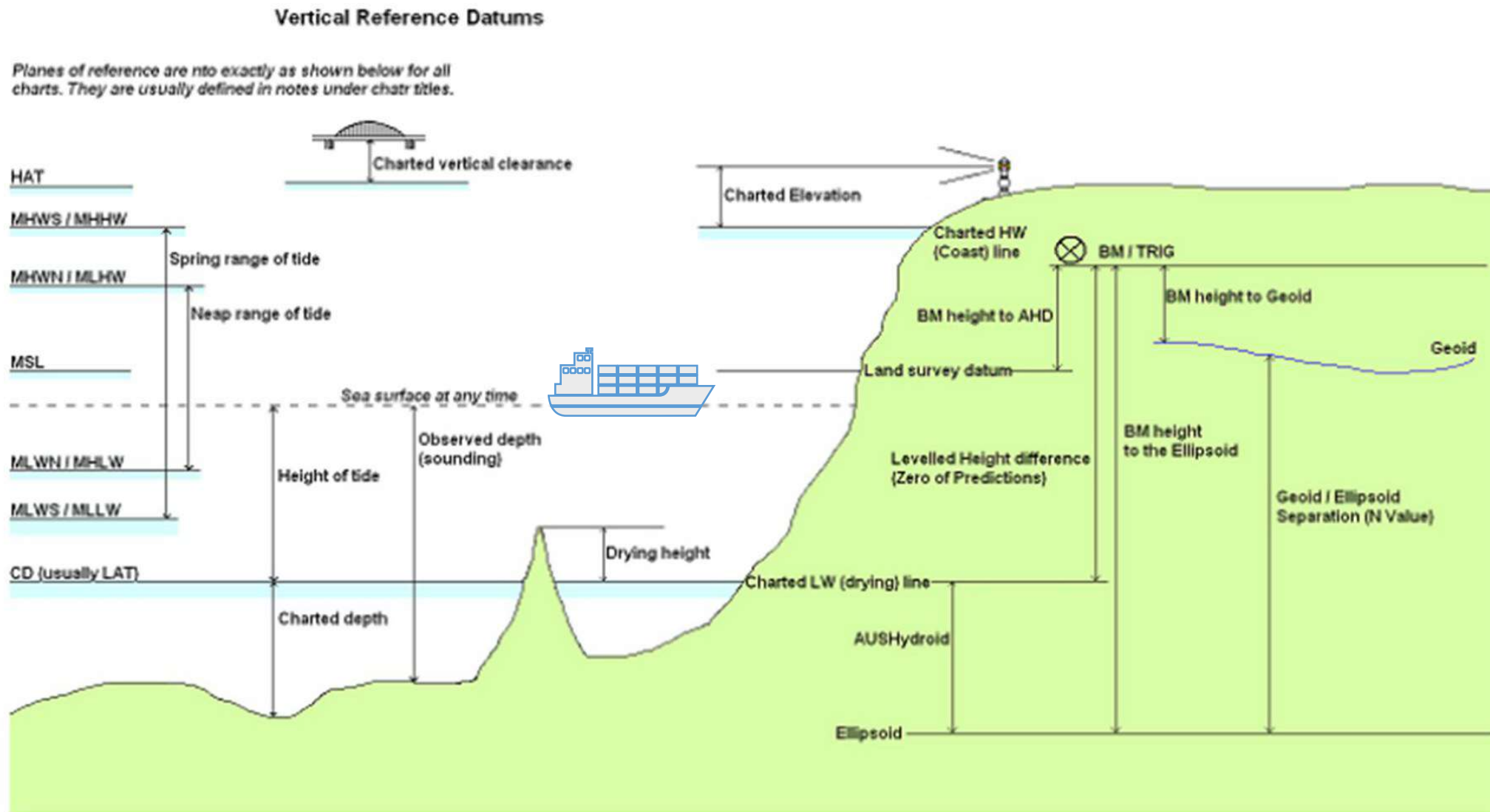# ASSESSMENT OF CSB DATA INTO OFFICIAL NAUTICAL CHARTS (PROPOSAL TO BE DISCUSSED)

1. Areas of CATZOC A1 and A2, not to be used (inaccurate position).
2. If accuracy horizontal position < 25m, could be used in zone B.
3. If accuracy horizontal position < 250m, could be used in zone C, D and U.
4. If CD - MSL separation < half the vertical uncertainty at a certain depth, could be used.

TWCWG5, VTC Event, 16 - 18 March 2021