Additional Vertical Datums S-100WG6 4.2B

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S-100 WG 6

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OVERVIEW

- Additional members of the S100 vertical datums enumeration.
- Change datatype from enumeration to codelist.
- Add an attribute to encode the epoch of the vertical datum.

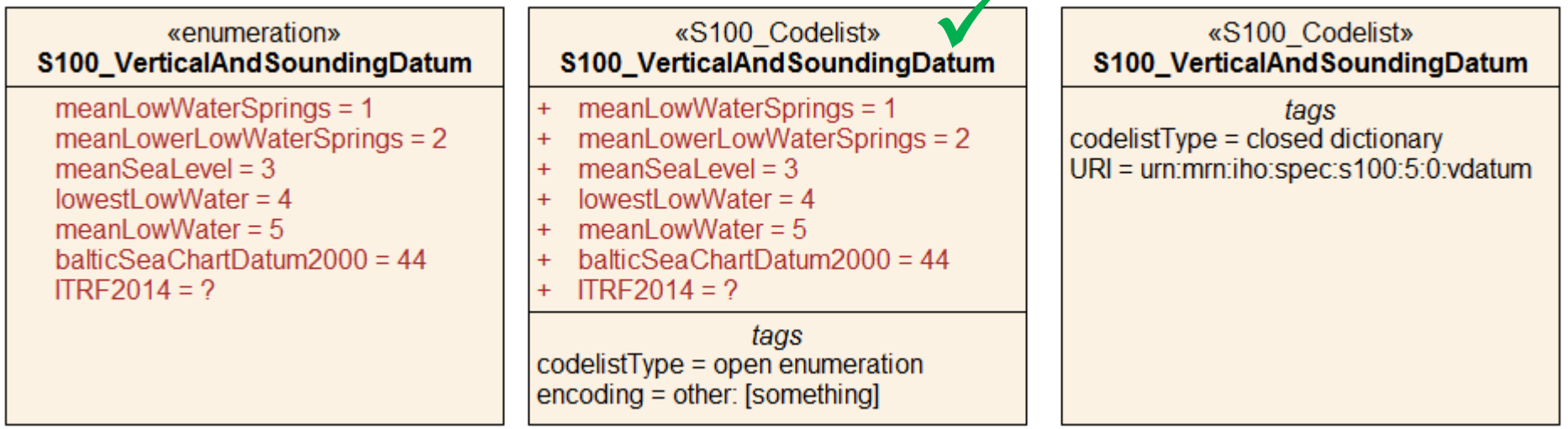
The effects of this proposal are further modified by Proposal 4.17.

ADDITIONAL VERTICAL DATUMS

- S-104 (and/or S-111) will use datums not enumerated in S-100 Ed. 4.0.0 Part 4a.
- TWCWG have discussed the additions and propose the following additions for S-100 5.0.0.
- The effect of this proposal will be modified by proposal S100WG6 4.17.

Name	Description	Code	Remarks
ITRF2014	International Terrestrial Reference Frame 2014	TBD	
ITRF2020	International Terrestrial Reference Frame 2020	TBD	
balticSeaChartDatum 2000	Baltic Sea Chart Datum 2000	44	
internationalGreatLakesDatum2020	International Great Lakes Datum 2020	TBD	
seaSurface	Sea surface	TBD	A two-dimensional (in the horizontal plane) field representing the air-sea interface, with high-frequency fluctuations such as wind waves and swell, but not astronomical tides, filtered out
seaBottom	Sea bottom	TBD	Local sea bottom reference
hydrographicZero	Hydrographic Zero	TBD	A vertical reference near the lowest astronomical tide (LAT, following IHO recommendation), below which the sea level falls only very exceptionally. The origin of the deviation between LAT and hydrographic zero may be due to a strong anticyclonic atmospheric condition, adding weight to the water column that may exceptionally cause the lowest sea level to fall below the astronomical low water level. The deviation between hydrographic zero and LAT must be less than 0.50 m.

DATATYPE IN S-100 DISCOVERY METADATA (FIG. 4A-D-4)



Current S-100 4.0.0
+ additional datums

Proposal – Add standard items
& modify datatype to
Open enumeration codelist

Discarded alternative
Modify datatype to
Dictionary codelist

- The proposal recommends using an “open enumeration” codelist for S100_VerticalAndSoundingDatum.
- The proposal adds the datums listed on a previous slide as standard members of the codelist.
- The proposal also proposes new text explaining the encoding of the “other:...” in vertical (and sounding) datums (see proposal – later slide depicts the effect of the proposed language).

EPOCH FOR VERTICAL DATUM

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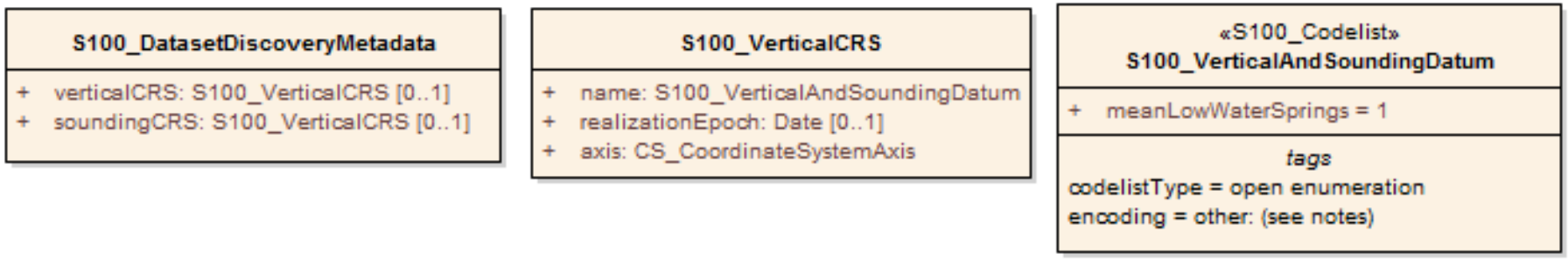
- Encoding the reference time period for vertical datum is needed for similar reasons to the use of “epoch” for indicating realizations of horizontal reference systems. Levelling adjustments result in periodic revisions to datums used for water levels.
- Proposal 4.2B and 4.17 have a cumulative effect, depicted below.
- This proposal adds *realizationEpoch* attribute to the vertical datum class (S100_VerticalDatumAndEpoch in this proposal).
- Proposal 4.17 renames the class *S100_VerticalDatumAndEpoch* to *S100_VerticalCRS* & adds *axis*.



EXAMPLE OF ENCODING IN DISCOVERY DATA XML

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Datum included in GI registry and included in the S-100 Ed. 5.0.0 table:

<S100XC:verticalDatum>meanLowWaterSprings</S100XC:verticalDatum>

Datum included in GI registry but not included in the S-100 table:

<S100XC:verticalDatum>other: localLowWaterReferenceLevel</S100XC:verticalDatum>

Other datum included in EPSG but not in IHO GI registry (and not in the S-100 table):

<S100XC:verticalDatum>other: EPSG_1287</S100XC:verticalDatum>

Other datum not included in EPSG or GI registry (and not in the S-100 table:

<S100XC:verticalDatum>other: abcde</S100XC:verticalDatum>

Not required to be machine-processable by applications, in order to encourage standardized datums.

Note that application software is not required to process information encoded in "other: …" form, meaning that ECDIS software, for example, is not required to recognise any datum encoded as "other: …" and will therefore be unable to adjust ENC depth information with water level data from the corresponding S-104 dataset, and may warn or reject the S-104 dataset as being incompatible with S-101 ENCs.

IMPACT

- Product Specifications
  - New Product Specifications can add restrictions to whatever is specified in S-100.
  - Old Product Specifications claiming compliance to Edition 4.0.0 will (can!) use only the datums listed in S-100 4.0.0.
  - The HDF5 encoding of metadata attributes was changed for S-100 5.0.0. Product Specifications complying with Edition 4.0.0 must be updated anyway.
  - The encoding of vertical datum within HDF5 datasets in Edition 5.0.0 does not use a complex attribute.
  - Impact on current and future product specifications: Negligible. Only Editorial changes are needed..
- Data producers
  - No data producer is expected to produce data for all the datums in the list.
  - S-100 WG5 4.14E changed the Ed. 4.0.0 encoding of vertical coordinate systems in HDF5 datasets.
- Applications
  - ECDIS and other applications that require datum consistency will continue to do so and are not obliged to apply datum corrections to inconsistent datums.

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Table 10c-6 (Ed. 5)

24	Vertical coordinate system	verticalCS	0..1	Integer	EPSG Code; Allowed Values • 6498 (Depth – Metres – Orientation down) • 6499 (Height – Metres – Orientation up)
25	Vertical coordinate base	verticalCoordinate Base	0..1	Enumeration	See Table 10c-24
26	Vertical datum reference	verticalDatumRefer ence	0..1	Enumeration	Only if verticalCoordinateBase = 2 See Table 10c-25
27	Vertical datum	verticalDatum	0..1	Integer	Only if verticalCoordinateBase = 2 If verticalDatumReference = 1 this is a value from S100_VerticalAndSoundingDatum If verticalDatumReference = 2 this is an EPSG code for vertical datum

Table 10c-24 (Ed. 5)

Item	Name	Description	Code	Remarks
Enumeration	verticalCoordinateBase	Codes for describing the base level of the vertical coordinate system		
Literal	seaSurface	The base of the vertical coordinate system is the sea surface	1	
Literal	verticalDatum	The base of the vertical coordinate system is a defined vertical datum	2	
Literal	seaBottom	The base of the vertical coordinate system is the sea floor	3	

Table 10c-25 (Ed. 5)

Item	Name	Description	Code	Remarks
Enumeration	verticalDatumReference			
Literal	s100VerticalDatum	The vertical datum is one of those listed in S100_VerticalAndSoundingDatum	1	
Literal	EPSG	The vertical datum is one of those listed in the EPSG Registry	2	

- Vertical datums not specifically named in the S-100 vertical datums enumeration or the EPSG registry can be encoded in the HDF5 file metadata using the “localDatum” member of the datums enumeration.
- S-100 4.0.0 and S-201 2.1.0 clause 12.7.4 include “localDatum” as an enumeration member.
- If there is a requirement to encode the name of an unlisted datum in HDF5 metadata, this can be done by adding a conditionally optional HDF5 string attribute “localVerticalDatumName” & adding “3: local” to Table 10c-25.