Paper for Consideration by TSMAD

Vertical Datum information in S-101

Submitted by:	S-101 work item leader
Executive Summary:	This paper seeks to clarify how vertical datum information is included within S-101 datasets. It proposes the inclusion of an example in the S-101 product specification to show the ISO 8211 encapsulation and a complex attribute to store the attribute level information.
Related Documents:	S-101
Related Projects:	S-101 DCEG

Introduction / Background

1. During the last review of the S-101 Data Classification and Encoding Guide (DCEG), it was noted that the encoding instructions for vertical datum still reflected the S-57 ENC approach. It is therefore necessary to review the guidance on vertical datum information in S-101 and ensure all content is correct and consistent within S-101. This paper reflects discussions between the S-101 work item leader, SevenCs and UKHO on this subject.

Analysis/Discussion

2. A short meeting was held between SevenCs and UKHO in Taunton to discuss this subject. This meeting noted that vertical datum information is separated into the following two types;

    1. Coordinate values – Soundings only

Encapsulation - Vertical datum specified within the ISO 8211 records.

    2. Attribute values – Height etc

Encapsulation - Vertical datum specified in both dataset metadata fields and at the feature level using the features Sounding Datum (M_SDAT) and Vertical Datum (M_VDAT).

Noting this, the current S-101 product specification and DCEG draft were reviewed.

The current draft of S-101 contains the following regarding Coordinate Reference Systems:

Coordinate Reference Systems (CRS)

Introduction

When describing geographic information it is common practice to separate the horizontal and vertical part of a position. This leads to 2D Coordinate Reference Systems for the horizontal positions and 1D Coordinate Reference Systems for the vertical positions. To describe 3D coordinates those Coordinate Reference Systems must be combined to produce a compound Coordinate Reference System. An ENC data set must define at least one compound CRS. An ENC compound CRS is composed of a 2D geodetic CRS (WGS84) and a vertical CRS.

Horizontal Coordinate Reference System

For ENC the geodetic datum of the horizontal CRS must be EPSG:4326 (WGS84). No projection is to be used. The full reference to EPSG: 4326 can be found at www.epsg-registry.org.

ENC data must be positionally accurate to within 0.3mm at the maximum display scale of the data to be considered accurately referred to WGS-84.

Vertical CRS for Soundings

Although all coordinates in a data set must refer to the same horizontal CRS different Vertical Datums can be used for the depth component of a coordinate tuple. Therefore the vertical CRS can be repeated. For each Vertical CRS a unique identifier is defined. Those identifiers will be used to indicate which Vertical CRS is used. Units must be in metres.

In S-101 depths are represented by positive values down and negative values for intertidal soundings (drying heights).

This content is accurate but would benefit from specifying the ISO 8211 records which must contain the CRS information. It was proposed that inclusion of the following example which is included in S-100 would help with this. This covers the information in type 1. as specified above.

Explanatory text

CSID: RCNM{15}!RCID{1}!NCRC{2}!
CRSH: CRIX{1}!CRST{1}!CSTY{1}!CRNM'WGS 84'!CRSI'4326'!CRSS{2}!SCRI!
CRSH: CRIX{2}!CRST{5}!CSTY{3}!CRNM'Mean Sea Level Depth'! CRSI!CRSS{255}SCRI!
CSAX: AXTY{12}!AXUM{4}!
VDAT: DTNM'Mean Sea Level'!DTID'VERDAT3'!DTSR{2}!SCRI!

3. To address the attribute value information, dataset attributes must to be added in the S-101 Feature Catalogue and aligned with the feature level attributes carried by Sounding datum and Vertical datum. Figure 1 contains a proposed complex attribute named Vertical datum to efficiently model vertical datum information in both dataset attributes and at the feature level. This model also proposes a single Vertical Datum Information feature to replace Sounding datum and Vertical datum.

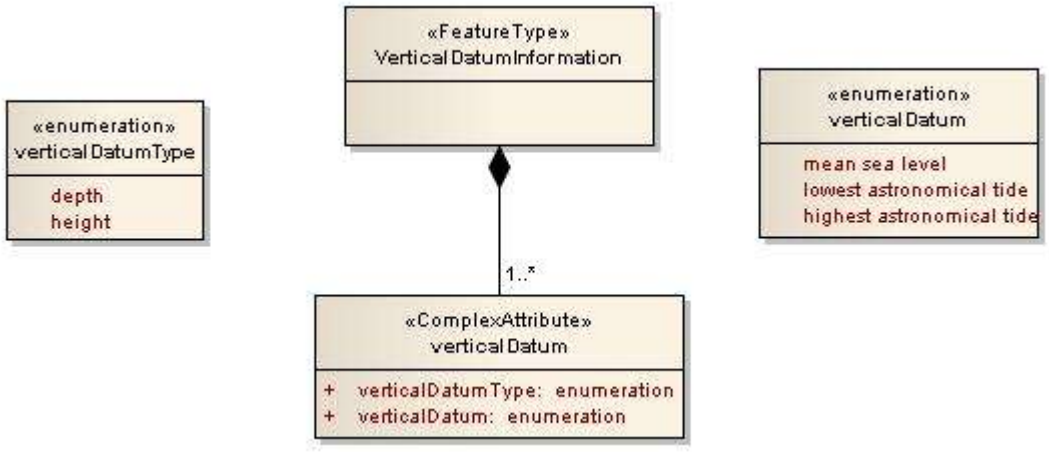

Figure 1 – Proposed complex attribute vertical datum

4. Within the DCEG guidance must be included on the population of dataset attributes within the dataset metadata section. Also guidance should be included at the feature level. TSMAD should consider whether Sounding datum and Vertical datum should be combined in a single feature type. The DCEG should not refer to the ISO 8211 records. Values at the coordinate level and attribute level should be consistent therefore validation checks for S-101 should check that values are consistent.

Conclusions

5. Vertical datum information has not been clearly specified within S-101. This paper proposes the inclusion of an example in the S-101 product specification and a new complex attribute within the S-101 feature catalogue to address this. It also proposes validation checks to ensure the information is consistent.

Recommendations

a) An example is included in the S-101 product specification to demonstrate the inclusion of vertical datum information in ISO 8211 records.

b) A new complex attribute is created for inclusion in the S-101 feature catalogue to carry attribute level vertical datum information and reflected in the S-101 DCEG.

c) Ensure S-101 validation checks incorporate a check to ensure that vertical datum information is consistent between the coordinate values and attribute level information.

d) Consider merging Sounding datum and Vertical datum into a single feature for S-101

Justification and Impacts

Vertical datum information will be clearly specified in S-101 which will ensure the appropriate information is included in S-101 ENCs and understood by software.

Action Required of TSMAD

The TSMAD is invited to:

a. endorse the recommended changes to S-101