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DQWG S-102 data quality indicators

DQWG TOR changes

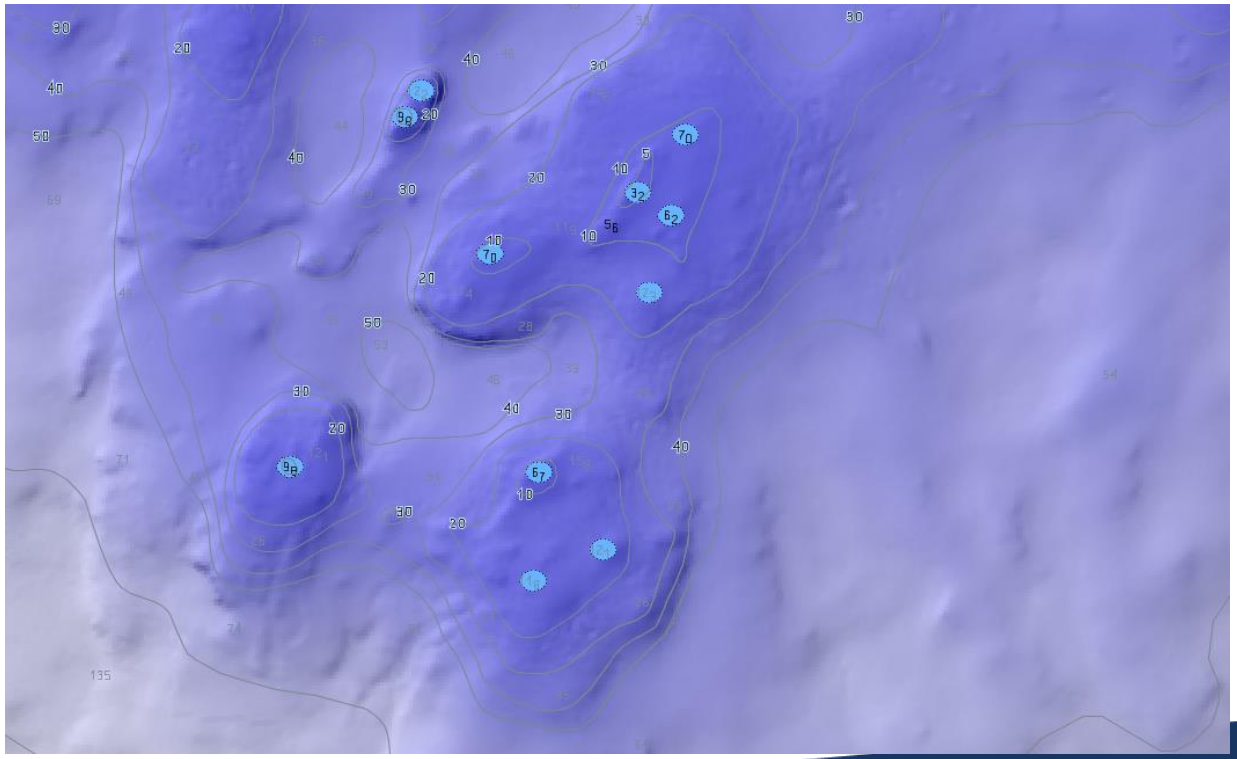
- TOR 1 Objective
  - To ensure that the data quality aspects are addressed in an appropriate and harmonized way for all S-100 based product specifications.
- TOR 3a Procedures
  - HSSC requires DQWG to provide advice on data quality aspects to all Working Groups (WGs) and Project Teams (PTs) developing S-100 based product specification.
- TOR 3b ii. Procedures
  - Periodically review S-100 based product specifications to ensure the data quality aspects have been taken into consideration and provide input papers for WGs and PTs consideration if deemed necessary.

History

- 2004/2005: Centre for Coastal and Ocean Mapping Joint Hydrographic Centre (CCOM JHC) organized workshops with industry, governmental and academic participants - mapping out the digital bathymethric product.
  - Result: Open Navigation Surface Working Group (ONSWG)
  - Open Navigation Surface Project: Main goal: Design and develop a specification for hydrographic gridded data.
- 2006: Bathymetric Attributted Grid Version 1.0.0 released
  - BAG designed to exchange data between HOs (large data amount)
- 2009: New S10X PS for the use of high definition bathymetry proposed:
  - as an auxiliary data layer to be used in conjunction with S-101 ENC data in navigational products.
  - S102 exchange data between HOs and end users (smaller data amounts)
- 2012: Release of S-102 1.0.0. (Official IHO standard)
  - October 2014 desicion made to improve into edition 2.0.0.

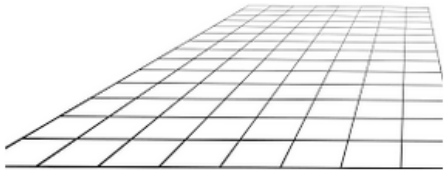
S-102 Product

- The offer: High resolution bathymetri – digital bathymetric model
- Primary purpose: To support safe navigation as an auxilliary aid to navigation.
- Secondary purpose: As an independent source of depth information that may be used for other purposes.
- Allows ECDIS to make intelligent adjustments such as contour intervals.
- Bathymethric Surface Data product is a hybrid of
  - S- 100 Part 8 (Coverages) and Part 4 (Information Types)

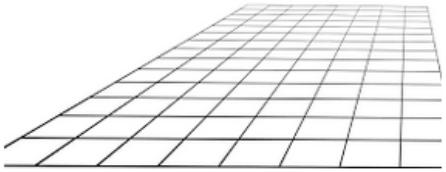


S-102 Product

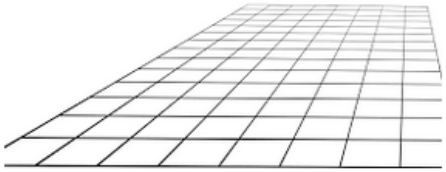
- Feature Catalogue:
  - The product contains three features:
    1. The bathymetry depth coverage (S102_DepthCoverage/elevation)
    2. The uncertainty coverage (S102_UncertaintyCoverage)
    3. The discrete point coverage (S102_TrackingList)



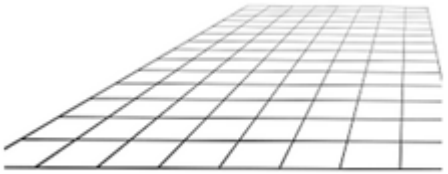
(S102_DepthCoverage)



(S102_UncertaintyCoverage)



(S102_TrackingList)



(S-102_OptionalCoverage)

S-102 Bathymetric Surface PS

- Different algorithms:
  - Shoalest depth – shoal bias
  - Shoalest depth true position
  - TPU weighted mean
  - Basic weighted mean

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S-102 quality indicators present

- (As of now) Two features defined:
  - Elevation value
  - Uncertainty value

15.2 U=0.1	14.9 U=0.2
15.4 U=0.3	16.0 U=0,1

- Each grid cell could be populated with an uncertainty value.

6 Data Quality

As defined in IHO S-100 Part 4c the data quality for the elevation coverage is also defined as a co- located coverage, uncertainty. **Uncertainty is defined as the vertical uncertainty at each node location**. The uncertainty coverage supports **multiple definitions of vertical uncertainty.**

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S-102 quality indicators present

- Product Specifications uncertainty table:

Value	Definition
Unknown	"Unknown" - The uncertainty layer is an unknown type
Raw_Std_Dev	"Raw Standard Deviation" - Raw standard deviation of soundings that contributed to the node.
CUBE_Std_Dev	Dev "CUBE Standard Deviation " - Standard deviation of soundings captured by a CUBE hypothesis (i.e., CUBE's standard output of uncertainty)
Product_Uncert	"Product Uncertainty" - NOAA standard product uncertainty V1.0 (a blend of CUBE uncertainty and other measures).
Historical_Std_Dev	"Historical Standard Deviation " – Estimated standard deviation based on historical/archive data.

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S-102 uncertainty surface

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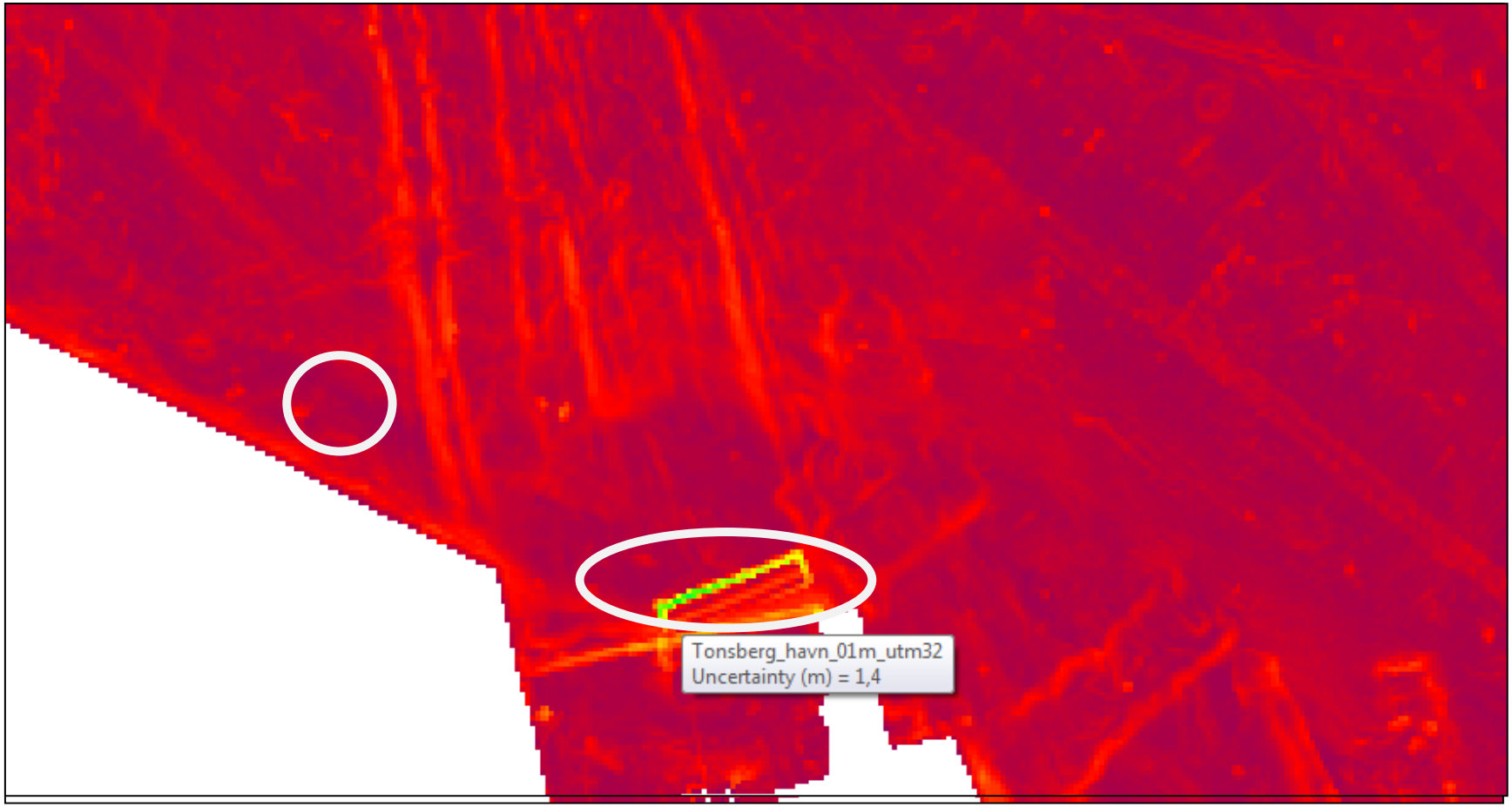
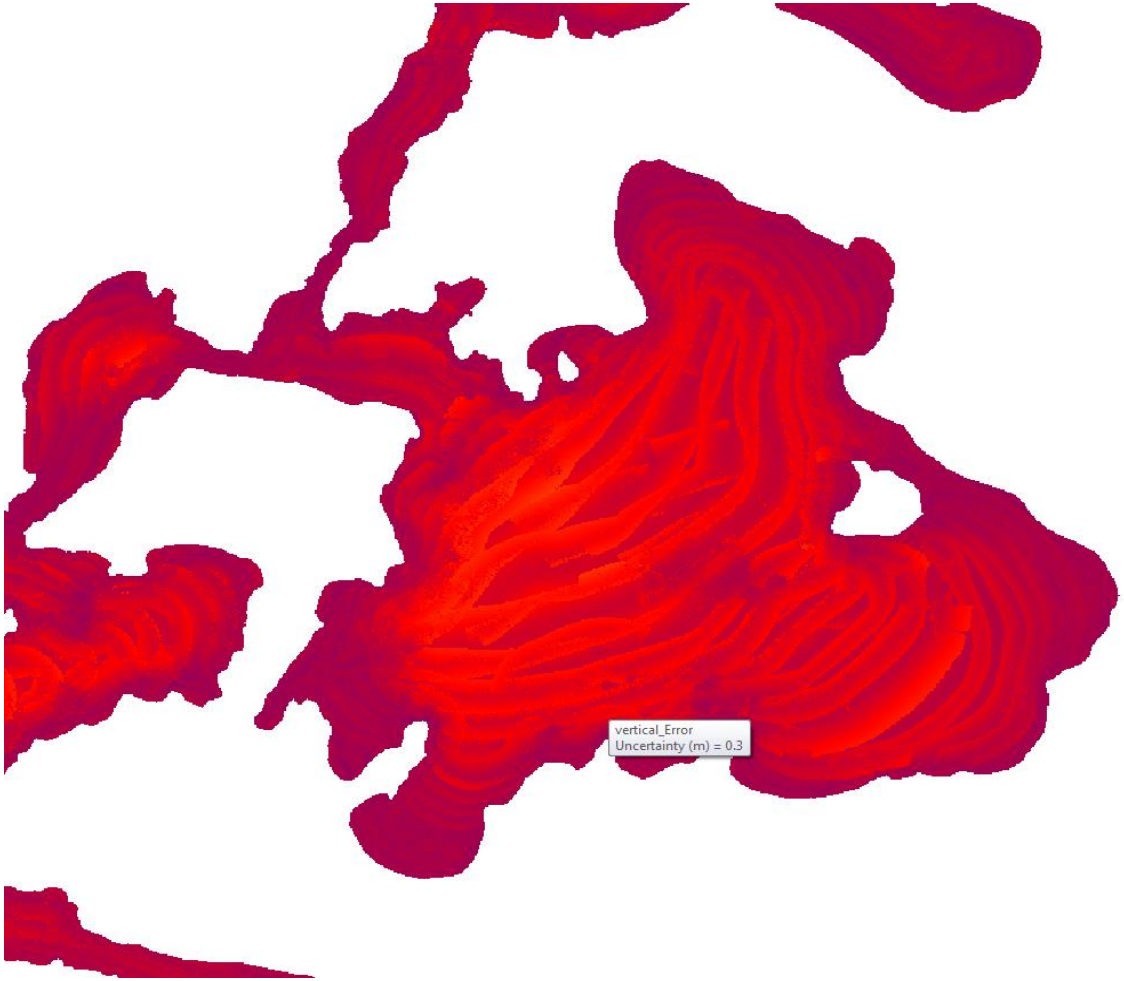
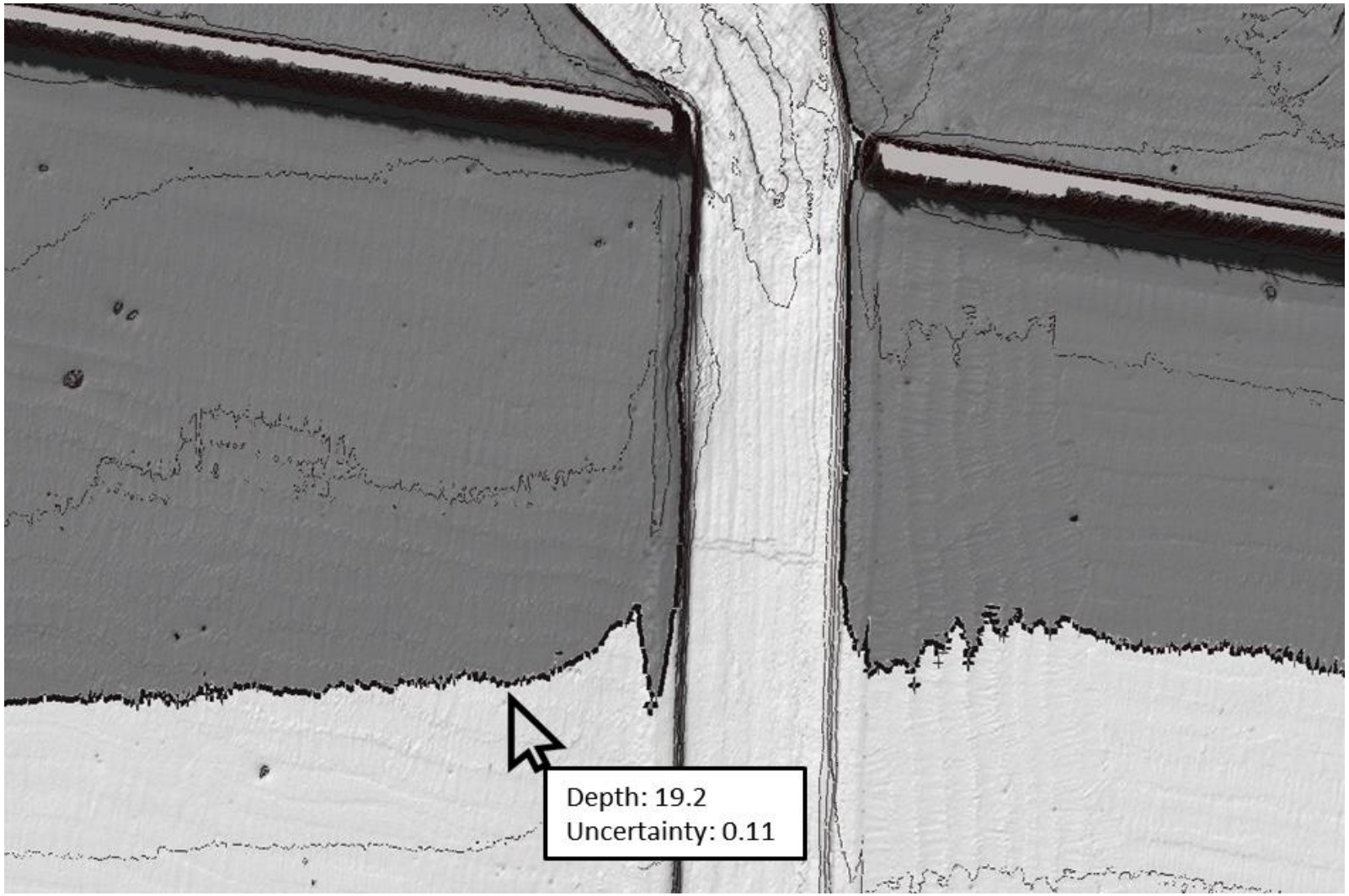


S-102 uncertainty surface



S-102 uncertainty display



- Figure 9.5 – Display of Grid Node Depth and Associated Uncertainty

Introducing more quality indicators?

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- Survey metadata
  - Special Order, Order 1a, Order 1b and Order 2
  - vertical uncertainty (TVU), total horizontal uncertainty (THU) and total propagated uncertainty (TPU)
- Calculation
  - Impact algorithm calculation
  - Need for identifying and displaying quality loss during calculation process?
- Model creation
  - Model specific degradation of quality?
  - Alignements and adjustements when combining datasets to fit a common model.
- Display
  - Restrictions in screen resolution, size etc.
- Purposes
  - Different indicators dependent on dataset purpose?

S-102 way forward

- Edition 2 being drafted and hopefully accepted during April meeting.
- To HSSC for approval – release 2018/2019

- Expectations from DQWG
  - Advice on the issues presented.
  - Eventual inclusion in edition 2 preferred.
  - Draft circulation for correspondence comments..etc

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