



22nd Conference Mediterranean and Black Seas Hydrographic Commission, MBSHC22

Validation of S-100-based products

SevenCs Hamburg



Progress of S-100 development

- Good progress during the last couple of years
- Maturity level of S-100 products has improved significantly
- Some products are already tested in operational distribution services

Status of S-100 Product Specifications

- Current S-100 Product Specifications focus on:
 - Content, encoding structure
 - Rules of portrayal
 - Metadata
 - etc.
- Validation rules are supposed to be included
 - Not available yet, specs have placeholders only
 - Dedicated Sub-Working Groups are dealing with it
 - A long way to go

IHO S-100 Implementation Roadmap

- Special focus on the following products:

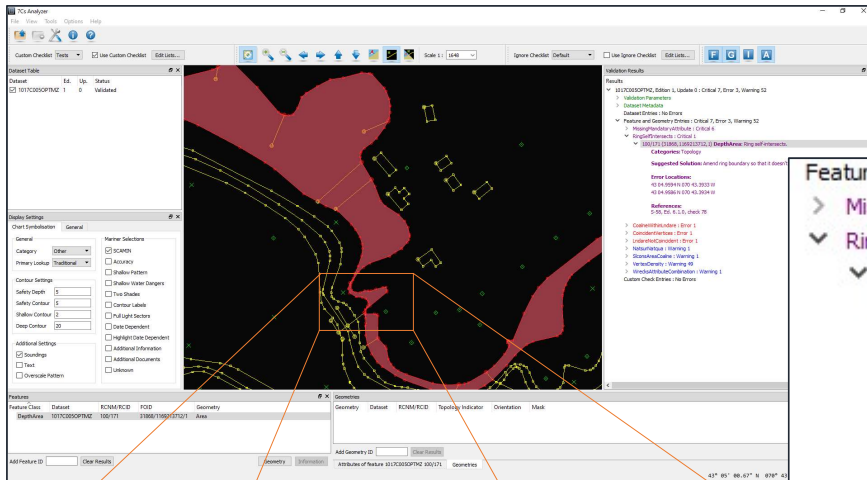
S-101	Electronic Navigational Chart (ENC)	mandated by IMO
S-102	Bathymetric Surface	optional
S-104	Water Level Information for Surface Navigation	optional
S-111	Surface Currents	optional
S-122	Marine Protected Areas	optional
S-123	Radio Services	optional
S-124	Navigational warnings	optional
S-129	Under Keel Clearance Management	optional

- New validation rules will be required
- For S-101 we can adopt certain rules from S-58
- For other products we must start from scratch

SevenCs role and activities

- Contribute to IHO sub-working groups dealing with the development of S-10x validation rules
- Provide validation software for test-beds
- Extend validation software to test new validation rules
- Implementation of dedicated data conversion checks:
 - on S-57 side, prior to conversion
 - resulting S-101 data

S-101 Validation – Example in 7Cs Analyzer



Feature and Geometry Entries : Critical 7, Error 3, Warning 52

> MissingMandatoryAttribute : Critical 6

▼ RingSelfIntersects : Critical 1

▼ 100/171 (31868,1169213712,1) DepthArea: Ring self-intersects.

Categories: Topology

Suggested Solution: Amend ring boundary so that it doesn't self intersect.

Error Locations:

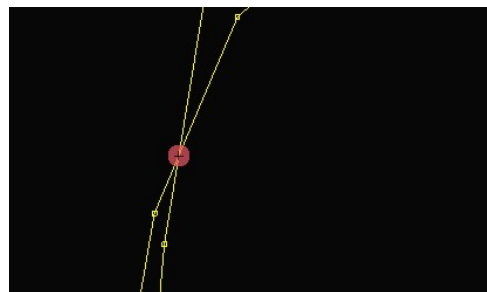
43 04.9594 N 070 43.3933 W

43 04.9586 N 070 43.3934 W

References:



highlighting the affected S-101 feature



highlighting the exact location of the error

S-101 specific error messages

S-101 Validation – Example in 7Cs Analyzer

The screenshot displays the 7Cs Analyzer interface. On the left, a list of feature classes is visible. The main window shows a map with a red polygon representing a ShorelineConstruction feature. A 'Validation Results' window is open, showing the following error:

Validation Results

Results

- > LndareNotCoincident : Error 1
- > NatsurNatqua : Warning 1
- ▼ SIconsAreaCoaline : Warning 1
 - 100/178 (31868, 1379680020, 1) **ShorelineConstruction: ShorelineConstruction** area with **waterLevelEffect = 1** (partly submerged at high water) or 2 (always dry) or not defined shares geometry with a **Coastline**.

Categories: Topology

Suggested Solution: Amend the features so that they don't share geometry or amend **waterLevelEffect** values.

Related Objects:
100/58 (31868, 124083334, 2247) **Coastline**
120/179

References:
S-58. Fd. 6. 1.0. check 51h

Below the map, a 'Features' window shows a table with the following data:

Feature Class	Dataset	RCNM/RCID	FOID	Geometry
ShorelineConstruction	1017C005OPTMZ	100/178	31868/1379680020/1	Area

Below the 'Features' window, a 'Geometries linked to feature 1017C005OPTMZ 100/178' window shows a table with the following data:

Geometry	Dataset	RCNM/RCID	Topology Indicator	Orientation
Surface	1017C005OPTMZ	130/67		
Exterior Ring	1017C005OPTMZ			
Composite Curve	1017C005OPTMZ	125/96		forward
Curve	1017C005OPTMZ	120/179		forward
Curve	1017C005OPTMZ	120/177		forward
Curve	1017C005OPTMZ	120/182		forward
Point	1017C005OPTMZ	110/146	beginning point	
Point	1017C005OPTMZ	110/145	end point	
Curve	1017C005OPTMZ	120/181		forward

S-101 specific error messages

Feature and Geometry relations of erroneous S-101 *ShorlineConstruction* for in-depths analysis

S-100 key aspect is interoperability

- Today ECDIS uses a single S-57 product only
- Proprietary overlays are vendor-specific
- S-100 ECDIS will support a variety of products
- Use of multiple products simultaneously
- Special interoperability rules are required
- => all this will have an impact on data validation!

Levels of S-100 data validation

- Generic S-100 checks
 - ISO 8211-related (e.g. record count, dataset structure)
 - HDF 5-related (e.g. general structure, data types)
 - Feature Catalogue (e.g. prohibited features)
 - ...
- Validation checks at single-product level
 - Checks specific to individual products (mandatory features, illegal geometric relationships of features, ...)

Challenges of S-100 data validation

- Sheer number of new checks that will be required is a challenge in itself
- New types of checks due to interoperability
 - Consistency across products (e.g. ENC vs. S-102)
 - Finding any contradictory information
 - Detecting redundant information
- Creating suitable test datasets
 - test validation checks at single-product level
 - test of interoperability checks
 - may demand greater effort than defining the checks

Our conclusion from industry perspective

- With more and more S-100 products in place, validation will become a much more complex task than it used to be
- Independent data validation must transform from being an isolated procedure into being an integrated process
- We want to contribute and support this process



Thank You

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