



16th Meeting of the Hydrographic Services and Standards Committee

Report of the Tides Water Levels and Surface Currents Working Group (TWCWG)

Agenda Item HSSC16-05.7A

HSSC-16, Tokyo, Japan, 27 – 31 May 2024



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PRINCIPAL ACTIVITIES AND ACHIEVEMENTS

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Intersessional work between TWCWG7 (February 2023) and TWCWG8 (February 2024)

1. Extensive development (by correspondence of the TWCWG Project Teams) of S-104 & S-111 Product Specifications. **S-104 and S-111 Editions 2.0.0** produced in draft form.
2. Workshop (second meeting, November 2023, Liverpool, UK) of the **International Association for the Physical Sciences of the Oceans (IAPSO)** Best Practice Study group on Tidal Analysis. **ACTION HSSC14/70.**
3. Second **Survey /Questionnaire**, kindly prepared by **KHOA**, for circulation to TWCWG Member States, on **Water Level (S-104) and Surface Currents (S-111) Data Production Methods and Data Formats.**
4. First **Survey/Questionnaire**, kindly prepared by **BRA**, on the subject of the **IHO Resolutions (M-3), Datums & Benchmarks, Resolution 3/1919 as amended, A2.5.**
5. Presentation to **Data Quality Working Group (DQWG), 19th meeting (DQWG19)** on the status of S-104 & S-111; an update on DQWG considerations from TWCWG7 and co-operation opportunities between TWCWG & DQWG.



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PRINCIPAL ACTIVITIES AND ACHIEVEMENTS *CONTINUED*

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TWCWG8 held via VTC, 20-22 February 2024.

62 Registered Delegates; 47 Member States; 15 Reps combined from IOC (GLOSS) & Industry.

- Initially planned to hold TWCWG8 as face to face in Monaco. Final decision taken in late 2023 to conduct the TWCWG8 meeting as a full VTC.
- Comprehensive agenda – good participation & engagement.
- Several new participants attended online.
- Note on TWCWG9; this will occur in **November 2024**. *ACTION HSSC14/71*.
Thereafter TWCWG will be planned annually each November.
- Note on TWCWG10; no location yet identified (it is difficult to find volunteers).



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PRINCIPAL ACTIVITIES AND ACHIEVEMENTS *CONTINUED*

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Discussed at TWCWG8

For S-104 Draft Ed 2.0.0

- S-104 Ed 2.0.0 is now 'pared back' [removed detail] to permit **only regularly-gridded data** at one or more times [DCF=2]. *Decision 8/27 of S-100WG8*
- S-104 designed **solely for gridded coverages** [observed / predicted / forecast] useful for **water level adjustment (WLA)** as described in **S-98 Annex C (C-4-2)**. Focus on Phase 1 implementation.
- TWCWG recommends an additional S-10x Product Specification to 're-include' the removed detail from S-104 Ed 2.0.0.
- Added 'uncertainty' as an optional real attribute in the data values record. (Re-used the existing concept in IHO GI Registry).
- Added material regarding requirements for compatibility with S-102 / S-101 in several sections (same horizontal CRS and vertical datums as S-102 Ed 2.2.0).
- Updated data quality checks to indicate checks that do not apply to regular grids.
- Updated validation checks:
 - Removed checks not applying to regular grids.
 - Added known checks for cross-product compatibility with S-102/S-101 for WLA purposes.
- All portrayal removed – (because the data will be used only for WLA; portrayal will therefore be according to S-102 or S-101).



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PRINCIPAL ACTIVITIES AND ACHIEVEMENTS *CONTINUED*

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Discussed at TWCWG8

For S-111 Draft Ed 2.0.0

- Added provision for non-uniform time series with moving platforms (DCF=4).
 - Values record for DCF=4 includes attribute *surfaceCurrentTime*
 - Time interval metadata attributes from DCF=8 now also applies to DCF=4 (they are extensions in S-111, as S-100 does not provide them for DCF=4).
- Added material regarding requirements for visual interoperability.
 - Consistency with S-104, where drying points or points on land must be populated with fill values.
 - No spatial overlap between S-111 datasets from the same producer.
 - Cross-compatibility checks in S-158 (validation checks) or S-98 (Interoperability) must be satisfied.
- Updated validation checks:
 - Added known checks for cross-product compatibility with S-104/S-101.
- All portrayal is now symbol-based (the arrow symbol will be displayed either at grid points or single point(s)).
- Floor for arrow size calculation increased to 1.50 knots to improve arrow visibility (feedback from NAUDEQ). Color bands remain the same.
- No surface current plots are specified in S-111 Ed. 2.0.0 (S-100 Edition 5.2.0 portrayal does not define a way to implement them on ECDIS).
- Pick report: New clause in Annex J to describe the notional tabular structure for time series data, derived from tidal stream tables in S-4 and S-98. (Applications permitted to improvise on this structure).



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PRINCIPAL ACTIVITIES AND ACHIEVEMENTS *CONTINUED*

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Discussed at TWCWG8

Common to both S-104 & S-111 for Eds 2.0.0

- Full alignment with draft S-100 Ed 5.2.0
- Digital Signature amended from DSA to ECDSA.
- Updated metadata to S-100 Ed. 5.2.0 (from Ed 5.0.0).
- Adoption of requirements for fileless cancellation, including resolving the security issue identified by PRIMAR.
- Adopted the restriction on bounding polygon for data coverage in discovery metadata.
- Added new EPSG codes to the list of permitted codes for horizontal CRS (same CRS as S-101).
- Removed old Annex B (Additional terms), moving selected terms to Clause 1.4.1.
- ISO metadata files are no longer allowed. (S-100 WG recommends not using them for Phase 1 products).
- UML diagrams have been updated or removed as appropriate.
- Updated Validation Checks:
 - Check ID format is now as decided by the S-100 validation checks sub-group.
 - Clarifications relating to dataset production (clause 7) including requirements pertaining to metadata and S-102/S-101 compatibility for S-198 WLA purposes.



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PRINCIPAL ACTIVITIES AND ACHIEVEMENTS *CONTINUED*

Outcomes from TWCWG8

S-104 & S-111 decisions

- TWCWG8 reached agreement on the way forward to produce Draft Editions 2.0.0 of both Product Specifications (operational editions); ready for submission to HSSC.
- Finalization of validation checks depends on developments in the S-100 Validation Checks and S-98 sub-groups. (i.e. “S-100 level” and “cross-product / interoperability” checks). TWCWG8 proposes that the checks should become an appendix, which will be added now, and any subsequent amendments can be incorporated later.

S-111 specific decisions

- Node-wise uncertainty; TWCWG8 agreed on the use of ***directionUncertainty*** to describe this.
- Portrayal Catalogue (PC):
 - Discussion on whether to update Ed. 1.0 PC (XSLT) or develop new Lua PC (tbc).
 - Update SVG symbols to conform to new S-100 Ed. 5.2.0 SVG schema.

Next Steps

- TWCWG and PT further review; address issues.
- Check by DQWG.
- Sample datasets.
- HSSC approval (from June 2024)
- Member State vote.
- Validation.
- Clarify production and distribution requirements and issues.
- Test datasets for ECDIS.



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PRINCIPAL ACTIVITIES AND ACHIEVEMENTS *CONTINUED*

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Outcomes from TWCWG8

- **TWCWG collaboration with HSWG to improve water level and surface current observation uncertainty standards in S-44.** TWCWG8 agreed to ensure re-engagement with HSWG. Small task group established to take this forward.
- **International Association for the Physical Sciences of the Oceans (IAPSO) Best Practice Study group on Tidal Analysis; poster session at the European Geosciences Union (EGU) General Assembly 2024, Vienna, 14-19 April 2024.**
<https://meetingorganizer.copernicus.org/EGU24/EGU24-7830.html>
- **Amendment to TWCWG TORs** (see red-line version submitted with this report). The only amendment is the change of “**Chairmanship**” to “**Chair**” and the **addition of the reference of the 14th HSSC meeting.**



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PROBLEMS OR OUTSTANDING ISSUES

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1. No significant problems identified.
2. Outstanding issues :
 - Difficult to encourage volunteer venues for in-person meetings, for TWCWG10+; (TWCWG9 planned for IHO Monaco in November 2024 (in-person only)).



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FUTURE WORK PROGRAMME

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TWCWG Work Plan 2024-2025

1. Maintain the list of standard tidal constituents.
2. Compare the tidal and tidal current predictions generated as a result of analysis of a common data set using different analysis software.
3. Support and Contribute to the International Association for the Physical Sciences of the Oceans (IAPSO) Best Practice Study group on Tidal Analysis.
4. Draft S-104 & S-111 Eds 2.0.0 and aim to publish by Q3/Q4 of 2024.
5. **Draft S-10x Ed 1.0.0, Water Level Information (non-Water Level Adjustment, WLA)**
6. Liaise with S-100WG on water level and current matters relevant to ECDIS applications.
7. Liaise with industry experts on the development of product specifications for water levels and currents.
8. Maintain an inventory of water level gauges and current meters used by Member States.
9. Review and maintain the Actual Tides and Currents On-Line links (ATOL).
10. Maintain and extend the relevant IHO standards, specifications and publications. (S-44 and C-13)
11. Maintain IHO Resolutions & Charting Specifications.
12. Develop and maintain material for CB course on Tides and Tide gauges.
13. Review and maintain the List of Chart Datums (CD) in use by Member States.



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ACTIONS REQUESTED FROM HSSC

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1. Note the TWCWG8 report.
2. Note proposed draft Eds 2.0.0 of S-104 & S-111 with a plan to publish in Q3/Q4 of 2024.
3. Note the TWCWG recommendation to create an additional S-10x Water Levels Product Specification, for “non-Water Level Adjustment, WLA” purposes, to ‘re-include’ the removed content from S-104 Ed. 2.0.0.
4. Agree amended TOR for gender-neutral language.
5. Agree and support work plan.