

3rd Surface Current Working Group Meeting

13 - 15 May 2015, Office of the Hydrographic and Oceanographic Department, Japan Coast Guard (JHOD), Tokyo, Japan

Report to the 7th meeting of the Hydrographic Services and Standards Committee

(Paragraph numbering is the same as the Agenda Item numbering and does not necessarily reflect the order in which matters were discussed.)

1 Opening

- 1.1 The Chair, Mr Kurt Hess (NOAA-USA), opened the meeting at 1007. He thanked the Hydrographic and Oceanographic Department, Japan Coast Guard (JHOD) for the meeting arrangements, particularly the availability of internet in the meeting room. He then thanked all participants for coming, particularly welcoming new members. He gave a brief synopsis of the work completed since the SCWG2 meeting and praised the commitment and efforts of all for the progress made, particularly on the development of the draft S-111 Product Specification document; he hope the momentum would be maintained over the next year and that it would be just as productive. All participants – representing Canada, France, Japan, Republic of Korea, Netherlands, Spain, USA (NOAA and NGA) and expert contributors from the Center for Coastal and Ocean Mapping at the University of New Hampshire (UNH), SPAWAR Atlantic, Jeppesen and SevenCs/Chartworld – introduced themselves. Administration and security arrangements were detailed. List of participants is at Annex A.
- 1.2 On behalf of the Hydrographic and Oceanographic Department, Japan Coast Guard (JHOD), Mr Shigeru Kasuga, Chief Hydrographer of Japan, welcomed all participants and wished them a successful meeting. He provided a brief outline of JHOD activities and the divisions of responsibilities. He noted the pending integration of the two specialist groups [namely the Tides & Water Level Working Group (TWLWG) and the Surface Currents Working Group (SCWG), thus forming the Tides Water Level & (Surface) Currents Working Group (TWCWG)]. He acknowledged the work of the two groups.
- 1.3 David Wyatt (IHB), on behalf of the Directing Committee, thanked JHOD for hosting the meeting and providing a high level of support and excellent facilities. He highlighted a number of topics and issues on which the participants should focus during the meeting.

The Chair endorsed these sentiments and he highlighted a need for continued active engagement by the SCWG members during and between meetings to progress action and Work Plan (WP) items.

2 Administrative Arrangements

- 2.1 The Chair introduced the Agenda which was adopted, Annex B. A list of documents for the meeting is at Annex C.
- 2.2 The timetable was agreed, and it was explained that this was intended for guidance only and was not intended to be a rigid structure. Where necessary time spent on individual topics would be amended to allow an appropriate discussion.
- 2.3 The Chair provided a brief outline of HSSC6 outcomes and S-100WG activities; he noted the HSSC comments that SCWG should have more awareness of KOR Test-bed activities and that closer engagement should be encouraged. He also highlighted items in the draft S-111 Product Specification document requiring work.

- 2.4 The SCWG2 list of Actions was reviewed. It was noted that the majority of Actions had been completed and those which remained would be covered by items in the agenda.

3 **Presentations**

A number of presentations were given, which highlighted the work being undertaken by various authorities and organizations. All generated considerable discussion and numerous questions.

- 3.1 JPN gave a presentation on the JHOD current information service.

KOR gave a presentation introducing the KHOA current prediction software and a brief status of the S-111 test-bed software.

France demonstrated SHOM's oceanographic forecast service.

- 3.2 SPAWAR Atlantic gave a presentation on Surface Current rendering, which covered development work on S-111 and visualization. This generated considerable discussion on distribution methods, maximum file size and the frequency of transmission. It was noted the need, for shipboard reception, to keep the file size in the region at or below 5 mb per file and below 10 mb per week due to the cost to customers and the available bandwidth.

- 3.3 Jeppesen provided a presentation giving details of the company and its relationship with Boeing; it also provided details on Jeppesen bridge systems and the external data provision to support ECDIS and ENC's.

This generated questions on the provision of ship parameters and how they are used to deliver forecasts back to the vessel; how the information was up-dated (real-time on the fly?) and the format for use in ships. The need to engage with the developers of S-411 – *sea ice* – and S-412 – *met-ocean forecasts* – were highlighted.

4 **Programme matters**

- 4.1 The Chair reported on the activities and discussions at TWLWG7, particularly the development of S-112 – *dynamic water level data product specification* – S-10x – *tidal height* – and the Capacity Building course. He noted that the proposal to include 'water density' in the Terms of Reference (ToR) had been generally supported and had been revised as 'relevant oceanographic data'. He highlighted the comments by the Chair of the S-100WG and the request that focus be directed to the development of the Standard List of Attributes for S-111; the on-going revision of the draft S-111 Product Specification (PS) document was acknowledged and the need to finalize the draft version was emphasised.

- 4.2 The Chair gave a presentation up-dating on the progress and development of the S-111 PS; he highlighted a number of areas which he considered needed to be addressed:

- i. Water level vertical reference
- ii. Uncertainty calculations
- iii. Real-time observations
- iv. Product structure and metadata format
- v. Reformatting into S-111

After discussion on how to address these issues, it was agreed these would be considered when reviewing the draft document.

4.3 UNH gave a presentation on the S-111 portrayal issues which needed to be addressed and decisions made on the way forward. A number of areas, which it was felt have yet to be revolved, were highlighted. These issues generated considerable discussion. Particular issues were:

- i. Use cases (*depending on the task being undertaken different portrayals/interactions would be suitable, a consideration as the PS is developed beyond the initial basic version - UNH*)
- ii. Types of data structures
- iii. Single data point – showing values
- iv. Numerical representation
- v. Customization tools
- vi. Use of user survey data
- vii. Legends
- viii. Uncertainty and how to portray

The Chair noted there were numerous portrayal options, however he noted with the time limits and need to create a usable version, there was a need to limit to minimum standards with the potential to develop further over the longer term if desired or a customer need was identified but not to delay the initial development.

It was acknowledged that SCWG could specify how the metadata was portrayed, CAN identified a need to finalise as much as possible at this stage of development.

Wider discussions on portrayal issues ensued, including minimum value to be displayed.

4.4 The Chair introduced the draft S-111 PS document session, highlighting what were considered to be the currently identified issues and problems, discussed the previous day, with some proposed solutions:

- i. Arrow size: for any geographic region
- ii. Symbol overlap: how to establish priority – S-100WG to set?
- iii. Current vector in the intertidal zone – HOs to solve?
- iv. Final data product format
- v. Time tag for data block: is it metadata?
- vi. Current attributes beyond speed and direction: Water Level
- vii. Current attributes beyond speed and direction: uncertainty
- viii. Thinning algorithm
- ix. Pick box: whether needed and what to display
- x. Numerical speed and direction values on vectors: when to display
- xi. Legend: where to place
- xii. Legend: number of bins
- xiii. Legend: minimum cut-off speed?
- xiv. Legend: scalable to maximum speed or fixed quantity?
- xv. Metadata block: how to display
- xvi. Decide on null value to use
- xvii. File size limit, what to do if greater than the 10mb limit?
- xviii. Overlapping current models between countries
- xix. Provide one default portrayal that does not limit the use of other portrayal for any other specific applications
- xx. Real-time observations, HDF5 the best format?

CAN provided details of the comments received during the recent development of the current draft PS document; additional some background details on the overall development and

progress were provided. CAN highlighted comments which were not immediately acceptable to allow wider discussion by participants.

The Chair then led the discussion on addressing the previously identified issues and problems set against the broader comments received on the current draft PS document. KOR noted no common standard currently exists for the arrow size or numeric value in Tidal Atlases; the format of Tidal Atlases and how to convert the data to a digital format was discussed. It was agreed there was a need to investigate and propose maximum vector size and scaling information for portrayal. **Action UNH** The grid spacing followed IHO S-52 rules and tidal atlas standards should be an appropriate guide as mariners are familiar with the UK's Total Tide format, although there appears to be no standard for paper products, generating the potential for confusion.

After lengthy discussions it was agreed not to include Water Level as an attribute of the Surface Current feature.

Estimates of uncertainty values need to be provided, but it was agreed that they should not be Surface Currents attributes. It was agreed to include uncertainty in the metadata in the following form: when the current speed was above a certain value, which needs to be defined, the uncertainty value is specified USA asked how it could be displayed for the mariner; the Chair indicated that uncertainty needed to have values specific to each data product. It was agreed the uncertainty value for speed and direction should be included in the metadata block for now.

Due to great density of displayed vectors upon zooming out, a need to investigate the Thinning Algorithm was identified, with appropriate solutions provided for comment. **Action KOR/UNH/SPAWAR**

The Chair asked participants what they considered should be the minimum data to be displayed in 'Pick Boxes', suggesting speed, direction and possibly uncertainty. It was agreed this data should be displayed, with the remaining metadata displayed as an option. Jeppesen recommended leaving it to the Original Equipment Manufacturers (OEMs) to decide where and how this was achieved.

It was also agreed that OEM would decide where and how current speed legends would be displayed; noting that a legend on the screen would indicate a particular layer was selected.

The portrayal issue for different current speeds was discussed at length against an initial break down of scale bins utilizing the standard 9 colours proposed by UNH. CAN noted currents greater than 16 knots were experienced on its west coast. IHB noted that similar conditions existed in European, South American (Cape Horn) and northern Australian waters, and IHB also noted that different users have varying requirements and an insignificant rate to one vessel may be of considerable significance to another depending on vessel size, capability and circumstances. The Chair suggested 1 knot bin intervals up to 9 knots be displayed as varying coloured symbols with the user able to interrogate to see the actual value. Jeppesen noted it was important to avoid changes in display format and colour configuration as the user would need to refamiliarize from one display to the next if maximum rates colours altered; it was agreed that it was better to maintain a consistency for shapes and colours at all times with variable bin values. KOR suggested different arrow styles could/should be used for speeds over a certain threshold; an example was displayed and KOR was requested supply examples for publishing on the website for further discussion. **Action KOR**

CAN suggested a variable bin size as rate increased with an initial 1 knot size, increasing to 2 and 3 knots; it was highlighted the need to maintain some discrimination at low flow rates. UNH displayed a dataset with a maximum rate of 1.6 knots using all the colour ranges, it was

considered unhelpful to display this in just one colour and size. It was agreed CAN, NLD and USA would generate proposals for variable bin scales for discussion. **Action CAN/NLD/USA**

The possibility to display null values in dataset points over land was considered but rejected. Further research, based on file size and IHO/ISO standards, was necessary to decide whether -1 or -99.999 is the most appropriate quantity to denote null values within data sets. **Action CAN/SPAWAR**

The Chair noted the maximum file size was not a limit for HOs, it applies to OEM delivering the datasets to the customer or if the HOs provided datasets directly. CAN noted that Met forecasts were issued at various scales depending on coverage – global, regional, localized area – which dictated the resolution and file size. The Chair indicated more work was required to optimize the file size against data content and that HOs would need to consider how best to package data for various areas. The potential for various scales depending on coverage with associated resolution of data to meet customer requirements was acknowledged with regional, coastal and harbour as suggested discrimination bands. It was highlighted that although the mariner at sea using ECDIS was the primary customer for S-100 based products, the format also needed to be suitable for other users. It was generally agreed that HDF5 met the present requirements and was an appropriate format with sufficient flexibility.

The present version of the draft S-100 PS document was displayed with the Chair highlighting a number of sections on which further work was required:

Paragraph 11.3 Dataset File Naming – file naming conventions were explained, with comments and input sought. It was noted that a number of ISO and IHO standards already existed for such items as country codes (ISO 3166 – 1alpha2), date and time format (ISO 8601), geographic co-ordinates (ISO 6709:2008) and primary producers codes (IHO S-62) and these needed to be followed; in particular it was noted that country code is mandatory. Jeppesen noted that a file extension was not required. It was agreed individual HOs can specify characters in name to ensure unique identifiers for each dataset. There was a need to confirm in S-100 whether UTC stated as standard time and how Land mask value is selected and displayed. **Action CAN/Jeppesen**

Paragraph F.3 Digital Tidal Atlas data – FRA noted in the SHOM example used that the Hour 1 is six hours ahead of HW, and that conversion to a time series was possible but quite complex. It was agreed individual HOs would be responsible to undertake transformation into time series data.

Paragraph 10.3 Metadata – as indicated previously, it was noted the primary producer codes were articulated in IHO S-62. It was agreed there was a need to identify whether items were mandatory or optional in the primary metadata table, Table 10.2. It was agreed to leave the level at which observations/data was referenced relative to a specified datum as this was considered valuable for observations and for other users beyond navigational uses. CAN noted the importance of specifying the datum. Table 10.2 was revised after considerable discussion and input from participants. Jeppesen noted the need to follow core metadata articulated in S-100 and that the Table should be consistent with S-100 and to harmonize Table 10.2 with core S-100 metadata. **Action Jeppesen** It was agreed that horizontal geographic positions should be quoted to match the maximum resolution of an ENC, normally 7 decimals of a degree.

KOR inquired if there should be an identification of the next ‘slack water’ period, it was noted the maximum flow rate would be identified within the datasets, either via predicted or forecast datasets; using the complete time series it should be possible to

identify via appropriate investigation. KOR noted the exact time was hard to identify from some datasets and suggested HOs should provide the exact time of 'slack water' and flag the data. CAN suggested the time of change of direction may be more useful; IHB noted 'slack water' was defined in the S-32 and that terms already defined in S-32 should be used, although revisions could be proposed if they were considered to be insufficient or inaccurate. FRA also noted the applicability of the Hydrographic Dictionary terms 'turn of the tide' and 'change of tide' in referring to change of direction. The Chair suggested the present definitions should first be reviewed for suitability and, if necessary revisions circulated for comment. Consider revised definition for 'slack water' for comment. **Action CAN/KOR/NLD/JPN/USA** All were asked then provide feedback and comment. **Action All** Chair decided to consider slack water as a potential, additional Surface Current attribute, to be added later when the definition, method of calculation, and portrayal were better defined.

The Vice-Chair displayed a revised variable bin scales table for current speed; it was agreed this should be inserted into the draft document for further consideration and investigation of the appropriateness of the revised bin scales and revised static legend for currents table. **Action KOR** It was agreed a revised draft PS document would be generated in light of discussions and circulate for comment. **Action CAN/USA** All were asked then provide feedback and comment on revised draft PS document. **Action All**

It was agreed to create test schema for Data providers. **Action CAN/Jeppesen**

All were encouraged to generate S-111 compatible test datasets for demonstration and discussion. **Action All**

SevenCs summarized responses to questions to four shipping companies about the display of surface currents in ECDIS. 0.5 knot intervals are preferable up to 3 knots. After that, the intervals can be larger. Surface Current data only activated as required, not visible all the time or as a layer. Possibly becomes visible when click on a particular place on the chart, and then as a pick report. Can the Surface Current data be fed through NAVTEX? Surface Current Data in real-time is useful at the Port Approach scales, otherwise modeled or forecast data is sufficient. Direction and magnitude are the two most important attributes.

5 Work Plan 2016-2017

The TWCWG Work Plan for period 2016-2017 was displayed and amended in light of the discussions and actions agreed at the meeting, Annex F. The revised Work Plan will be presented to HSSC7 for approval.

6 Review of TWCWG ToRs

The ToRs and RoPs, as approved by HSSC6, were displayed and reviewed. A number of amendments were proposed, which will be presented to HSSC7 for comment and approval. Annex E.

7 Any Other Business

- 7.1 The Chair briefed participants on the background to the reorganization of TWLWG and SCWG; the options for the future conduct of work were presented – either create a separate SCPT or fully integrate with TWCWG as an identified Work Package. It was acknowledged that TWLWG had brought a number of other work strands into the combined WG in addition to the development of two S-100 based PS. As the new structure for subordinate bodies of HSSC allowed considerably greater flexibility to form PT, it was agreed to meet as a single

WG for the 1st meeting of TWCWG and to review the suitability of the decision to be a Work Package at the end of the meeting.

- 7.2 The Chair briefed the participants on the election process for the Chair and Vice-Chair of TWCWG. The SCWG unanimously endorsed the election result and the request to IHB for continuation of secretarial support.
- 7.3 IHB noted some minor changes to traditional work items undertaken by TWLWG as a result of the integration and briefed participants on those items for which their involvement was anticipated. As for TWLWG members, it was agreed participants would contact their national representative attending RHCs to raise awareness of inventory of tide gauges and current meters to encourage input and updating of the information displayed on the IHO website. **Action All** Participants were reminded of the need to regularly check entries and provide updates and amendments to IHB as necessary. **Action All**

IHB also briefed participants on the list of Actual Tides On-Line Links and the work being undertaken by AUS to convert it into Excel format; again participants were requested to check the list of links and provide up-dates and amendments to the information provided to ensure content is current and all links work. **Action All**

8 Review of Action Items

The list of Actions for the meeting was displayed and some revisions were made and agreed, Annex D. All participants were reminded to regularly check the list and keep the Chair and IHB informed of progress with allocated actions. **Action All**

9 Venue and dates of the 1st TWCWG Meeting

The participants were briefed on the historical background reasons behind the rotation between north and south hemispheres, particularly the remit of the WG to provide advice and develop capacity and capability amongst developing maritime nations, in addition to the formal delivery of the CB course, which is under development. It was noted that contact had been made with the Chilean HO (SHOA) with a request to investigate whether they would be in apposition to host TWCWG1, CAN offered to investigate hosting the meeting in Victoria as an alternative. It was agreed that the location and dates (late April/early May) for TWCWG1 would be notified to TWCWG members at the earliest opportunity to facilitate planning and budgeting. **Action IHB**

10 Draft Report to the HSSC

It was agreed that the IHB would circulate a draft meeting report to all attendees by 29 May. **Action IHB**. Attendees were requested to provide any comments by 12 June. **Action ALL**. It was intended the final meeting report would be published by 26 June. **Action IHB**

The IHB, the Chair and the vice-Chair would prepare the final report to HSSC7 using the format required by HSSC. Representation of TWCWG at the HSSC7 meeting would be discussed between the Chair and the Vice-Chair. **Action IHB, FRA & CAN**

11 Closing remarks

The Chair noted the end of SCWG and indicated he was prepared to continue to coordinate and lead the efforts and work for the development of the S-111 PS within TWCWG and looked forward to the continuing successful collaboration so evident over the life of SCWG. The Chair thanked everyone for coming to the meeting and for the effort and enthusiasm towards the task; he wished them a safe journey home. He also thanked the JHOD for their

excellent support and organization, both of which helped greatly in the success of the meeting. JHOD thanked all for coming to Tokyo and expressed their satisfaction that the meeting had made such progress and been deemed to be a success, they wished all travelling a safe journey home and those remaining a pleasant stay.

The meeting closed at 1340.

The following Annexes are attached:

- A. SCWG3 – List of Participants.
- B. SCWG3 – Agenda
- C. SCWG3 – List of Documents
- D. SCWG3 – List of Actions
- E. SCWG3 – Proposed revised TWCWG ToRs and RoPs
- F. SCWG3 – Draft TWCWG Work Plan 2016-2017
- G. TWLWG7 – Draft TWCWG1 agenda

**IHO Surface Current Working Group (SCWG)
List of Participants SCWG 3**

Member State	Organization	Name	E-mail
Canada	Canadian Hydrographic Service	Bodo de Lange Boom	Bodo.deLangeBoom@dfo-mpo.gc.ca
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USA	National Oceanic and Atmospheric Administration	Kurt Hess (Chair)	kurt.hess@noaa.gov
USA	National Geospatial-Intelligence Agency	Mark Opdyke	mark.r.opdyke@nga.mil
IHB	IHB	David Wyatt (Secretary)	adso@iho.int
Expert Contributor	Centre for Coastal and Ocean Mapping, University of New Hampshire, Durham, NH, USA	Briana Sullivan	Briana@ccom.unh.edu

Expert Contributor	SPAWAR Atlantic	Edward Weaver	eweaver@wrsystems.com
Expert Contributor	Jeppesen	Eivind Mong	eivind.mong@jeppesen.com
Expert Contributor	SevenCs/Chartworld	Emma Fowler	emma.fowler@chartworld.com

Surface Currents Working Group
(3rd Meeting 13 – 15 May 2015 – Tokyo, Japan)
Agenda – (SCWG 3)

1 Opening (10:00 AM)

- .1 Opening address by the Chairman – Kurt Hess
- .2 Welcome address by Host – Shigeru Kasuga, Chief Hydrographer of Japan
- .3 Welcome by the IHB – David Wyatt

2 Administrative Arrangements

- .1 Adoption of the Agenda – Kurt Hess
- .2 Conduct of the Sessions – Kurt Hess
- .3 Report on Intercessional Activities including HSSC 6 – Kurt Hess
- .4 Matters arising from SCWG 2/Review of Work Plan and Action Items – Kurt Hess

3 Presentations

- .1 National Programmes:
 - Current information service by JHOD (Satoshi Yamao)
 - Introduction of KHOA current prediction software and brief status of S-111 test-bed software (Sewoong Oh)
 - France’s oceanographic forecast services (Ronan Pronost)
- .2 Demonstration of Currents Display Tests (Ed Weaver)
- .3 Related Work by Jeppesen (Evind Mong)

4 Programme Matters

Note:{xx} indicates SCWG Work Plan reference

- .1 Report on engagement with other IHO bodies (TWCWG). {C.4} (Kurt Hess)
- .2 Review of Data Issues {B.2, C.2} (Kurt Hess)
- .3 Review of Portrayal Issues {C.2} (Briana Sullivan)
- .4 Review of Draft Product Specification S-111 {B.1, C.1} (Louis Maltais)

5 Work Programmes 2016-2017

- .1 TWCWG Work Plan up-dates – IHB
- .2 Review SCPT Work Plan – IHB

6 Review of TWCWG and SCPT ToRs

- .1 Review TWCWG ToRs and RoPs – IHB
- .2 Review SCPT ToRs and RoPs – IHB
- .3 Proposal to include water density.

7 Any Other Business

- .1 WG reorganization plans and integration with TWCWG
- .2 Selection of TWCWG chair and vice-chair

.3 Selection of SCPT chair and vice-chair

8 Review of Action Items

9 Venue and dates of the 1st SCPT Meeting

10 Draft Report to the TWCWG 1 / Draft Agenda for SCPT 1

.1 TWCWG 1 Draft Agenda

.2 SCPT 1 Draft Agenda

11 Closing remarks

SCWG 3 - List of Documents

Document No	Document Title
SCWG3-Invitation Letter	Letter of Invitation
SCWG3-Logistics	Logistic Information-Annex B
SCWG3-Map	Location map-Annex C
SCWG3-Registration	Registration Form-Annex D
SCWG3-Visa	Visa Assistance Form-Annex E
SCWG3-2.1-Agenda	SCWG 3 Agenda v6.0
SCWG3-2.2-Programme	SCWG 3 Programme v1.0
SCWG3-2.3-1	SCWG Report to HSSC6
SCWG3-2.3-2	SCWG Presentation to HSSC6
SCWG3-2.3.3	Extract HSSC6 Report
SCWG3-2.4-List of Actions	SCWG 2 List of Actions Updated 23 April 2015
SCWG3-4.4	Surface Current Draft PS Ver 1.5
SCWG3-5.1	TWCWG WP 2016-17
SCWG3-5.2	SCPT WP 2016-17
SCWG3-6.1	TWCWG TOR
SCWG3-6.2	SCWG TOR
SCWG3-10.1	TWG WG 1 Proposed Agenda v1.0
SCWG3-10.2	SCPT 1 Proposed Agenda v1.0
SCWG3-Presentations	Presentations.zip
SCWG3-Participants	SCWG 3 List of Participants

LIST OF ACTIONS – Updated 15 June 2015

Agenda Item	Subject	Status/Date	Comments	Action
SCWG2				
4.5	S-111 test data sets	31 Jul	In light of feedback comments, provide amended test data sets to SPAWAR Atlantic	CAN/USA/FRA/NLD
SCWG3				
4.4a	S-111 Product Specification	27 Nov	Investigate Thinning Algorithm and to propose appropriate solutions for comment	KOR/UNH/SPAWAR
4.4b	S-111 Product Specification	27 Nov	Investigate and propose maximum vector size and scaling information for portrayal	UNH
4.4c	S-111 Product Specification	31 Jul	Provide examples of different arrow styles for higher speeds	KOR
4.4d	S-111 Product Specification	31 Jul	Investigate appropriateness of revised static legend for currents table	KOR
4.4e	S-111 Product Specification	31 Jul	Generate proposals for variable bin scales for comment	CAN/NLD/USA
4.4f	S-111 Product Specification	31 Jul	Research whether -1 or -99.999 is most appropriate way to indicate null values within data sets	CAN/SPAWAR
4.4g	S-111 Product Specification	27 Nov	Confirm in S-100 whether UTC stated as standard time, and how Land mask value is set (metadata or document)	CAN/Jeppesen
4.4h	S-111 Product Specification	26 Jun	Harmonize Table 10.2 with core S-100 metadata	Jeppesen
4.4i	S-111 Product Specification	31 Jul	Create test schema for Data providers	SPAWAR/Jeppesen
4.4j	S-111 Product Specification	31 Jul	Consider revised definition for 'slack water' for comment	CAN/KOR/NLD/JPN/USA
4.4k	S-111 Product Specification	25 Sep	Provide feedback on revised definition of 'slack water'	All
4.4l	S-111 Product Specification	31 Jul	Revise draft PS document in light of discussions and circulate for comment	CAN/USA
4.4m	S-111 Product Specification	25 Sep	Provide feedback on revised draft PS document	All
4.4n	S-111 Product Specification	TWCWG1	Generate S-111 compatible test datasets for demonstration and discussion	All

7.3a	Inventory of tide gauges and current meters	On going	Contact national representative attending RHCs to raise awareness of inventory and encourage input and updating of information	All
7.3b	Inventory of tide gauges and current meters	On going	Regularly check entries and provide up-dates and amendments to IHB as necessary	All
7.3c	Actual Tides On-line Link	On going	Check and provide up-dates and amendments to the information provided to ensure content is current and all links work	All
8	Action List	On going	Keep IHB informed of progress with allocated action	All
9	Next meeting	26 Jun	Provide location and dates of 1 st meeting of TWCWG at earliest opportunity in liaison with host	IHB
40a	SCWG 3 Draft Report	29 May Complete	Draft to be circulated for comment	IHB
40b	SCWG 3 Draft Report	12 Jun Complete	All to provide comments on draft report to IHB	All
40c	SCWG 3 Final Report	26 Jun Complete	Publish final report	IHB
10d	Report to HSSC7	17 Jul	Draft report for review and amendment by FRA and CAN	IHB
10e	Report to HSSC7	11 Sep	Comments back to IHB	Chair/Vice-Chair

Tides, Water Level and Currents Working Group (TWCWG)

Terms of Reference and Rules of Procedure

Reference: 6th HSSC Meeting (Viña del Mar, Chile, November 2014)

1. Objective

- a) To provide technical advice and coordination on matters related to tides, water levels, currents, **relevant physical oceanographic data** and vertical datums, including **integrated** water level/ **and** current **data** models.
- b) To support the development and maintenance of related specifications in liaison with the relevant IHO bodies and non-IHO entities;
- c) To develop and maintain the IHO publications for which the WG is responsible.

2. Authority

This WG is a subsidiary of the Hydrographic Services and Standards Committee (HSSC). Its work is subject to HSSC approval.

3. Composition and Chairmanship

- a) The WG shall comprise representatives of IHO Member States (MS), Expert Contributors (EC), observers from accredited NGIO, and a representative of the IHB (“IHB” to be replaced by “IHO Secretariat” when the IHO Secretariat is established). A membership list shall be maintained and posted on the IHO website.
- b) EC membership is open to entities and organizations that can provide a relevant and constructive contribution to the work of the WG.
- c) The Chair and Vice-Chair shall be a representative of a MS. The election of the Chair and Vice-Chair shall be decided at the first meeting after each ordinary session of the Conference (Conference to be replaced by Assembly when the revised IHO Convention enters into force) and shall be determined by vote of the MS present and voting.
- d) If a secretary is required it should normally be drawn from a member of the WG.
- e) If the Chair is unable to carry out the duties of the office, the Vice-Chair shall act as the Chair with the same powers and duties.
- f) ECs shall seek approval of membership from the Chair.
- g) EC membership may be withdrawn in the event that a majority of the MS represented in the WG agrees that an EC’s continued participation is irrelevant or unconstructive to the work of the WG.
- h) All members shall inform the Chair in advance of their intention to attend meetings of the WG.
- i) In the event that a large number of EC members seek to attend a meeting, the Chair may restrict attendance by inviting ECs to act through one or more collective representatives.

4. Procedures

- a) The WG should:
 - (i) monitor and develop the use of tidal, water level, **and** current information **and** **relevant physical oceanographic data** including **integrated** water level/ **and** current **data** models;

- (ii) advise on the use of vertical datums;
 - (iii) advise on tidal, water level and current observation, analysis, forecast and prediction;
 - (iv) advise on matters concerning exchange, distribution and use of tidal, water level, ~~and~~ current information and relevant physical oceanographic data and related ~~data~~/information;
 - (v) study principles and contribute to the development of improved methods for conveying tidal, water level, ~~and~~ current information and relevant physical oceanographic data to mariners and other users;
 - (vi) keep under review the relevant IHO publications and resolutions in order to advise HSSC on their updating;
 - (vii) draft or revise guidance document(s), resolutions and specifications as appropriate and as instructed by HSSC; and
 - (viii) consider new related topics as instructed by HSSC and advise HSSC accordingly.
- b) The WG should work by correspondence, teleconferences, group meetings, workshops or symposia. The WG should meet about once a year. When meetings are scheduled, and in order to allow any WG submissions and reports to be submitted to HSSC on time, WG meetings should not normally occur later than nine weeks before a meeting of the HSSC.
- c) Decisions should generally be made by consensus. If votes are required on issues or to endorse proposals presented to the WG, only MS may cast a vote. Votes at meetings shall be on the basis of one vote per MS represented at the meeting. Votes by correspondence shall be on the basis of one vote per MS represented in the WG.
- d) The date and venue of group meetings shall normally be announced by the Chair at least six months in advance.
- e) The draft record of meetings shall be distributed by the Chair (or the secretary) within six weeks of the end of meetings and participants' comments should be returned within three weeks of the date of despatch. Final minutes of meetings should be posted on the IHO website within three months after a meeting.
- f) Sub-working groups and project teams may be created by the WG or proposed to HSSC to undertake detailed work on specific topics. The terms of reference and rules of procedure of the sub-working groups and project teams are determined or proposed by the WG as appropriate.
- g) The WG should liaise with other IHO bodies, international organizations and industry to ensure the relevance of its work.
- h) The WG should prepare annually a report on its activities and a rolling two-year work plan, including expected time frame.

TWCWG WORK PLAN 2016-17

Objective

- a) To monitor developments related to tidal and water level observation, analysis and prediction and other related information including vertical and horizontal datums;
- b) To develop and maintain the relevant IHO standards, specifications and publications for which it is responsible in liaison with the relevant IHO bodies and non-IHO entities;
- c) To develop standards for the delivery and presentation of navigationally relevant current information; and
- d) To provide technical advice and coordination on matters related to tides, water levels, currents and vertical datum.

Tasks

A	Maintain the list of standard tidal constituents (IHO Task 2.7.2.3)
B	Compare the tidal predictions generated as a result of analysis of a common data set using different analysis software
C	Develop, maintain and extend a Product Specification for digital tide tables (IHO Task 2.7.3)
D	Develop, maintain and extend a Product Specification for the transmission of real-time tidal data (IHO Task 2.7.4)
E	Develop, maintain and extend a Product Specification for the transmission and portrayal of navigationally significant current surface data (S-111 - IHO Task 2.13.3)
F	Develop, maintain and extend a Product Specification for dynamic tides in ECDIS (IHO Task 2.7.5)
G	Liaise with S-100WG on tidal and current matters relevant to ECDIS applications
H	Liaise with industry experts on the development of product specifications for tides and currents
I	Prepare and maintain an inventory of tide gauges and current meters used by Member States and publish it on the IHO/TWLWG web site (IHO Task 2.7.2.4)
J	Review feedback of on-line real time water level observation document
K	Maintain and extend the relevant IHO standards, specifications and publications as required (IHO Tasks 2.7.2 and 2.13.2)
L	Conduct the 2016 and 2017 meetings of TWCWG and its sub-group(s) and project team(s) (IHO Tasks 2.7.1 and 2.13.1)
M	Develop and maintain material for course on Tides, and Water Levels and Currents

Work item	Title	Priority H-high M-medium L-low	Next milestone	Start Date	End Date	Status P-planned O-ongoing C-completed S-Superseded	Contact Person(s)	Related Pubs / Standard	Remarks
A.1	Maintain the list of standard tidal constituents	M		-	Permanent	O	Chris Jones*		Review current list of published tidal constituents
B.1	Compare the tidal predictions generated as a result of analysis of a common data set using different analysis software.	M		-	Permanent	O	Hilda Sande * All		Select Common data set Analyze using different software Predict common set of tides Compare results
C.1	Develop, maintain and extend the standard for digital tide and tidal current tables	H	Prepare draft Standard	2009	2016	O	Peter Stone* Chris Jones Zarina Jayaswal		
D.1	Develop and maintain a standard for the transmission of real-time tidal data (S-112)	H		2009	2017	O	Chris Jones* All		Establish joint project teams as required. Liaise with S-100WG (see H.1) Liaise with industry experts (see I.1)
E.1	Develop and maintain a product specification for the transmission of surface current data (S-111)	H		2013	2017	O	Kurt Hess* Louis Maltais Mark Opdyke		Establish joint project teams as required. Liaise with S-100WG (see H.1) Liaise with industry experts (see I.1)
E.2	Develop and maintain a product specification for the portrayal of navigationally significant surface currents	H		2013	2017	O	Louis Maltais* Kurt Hess Mark Opdyke		Establish joint project teams as required. Liaise with S-100WG (see H.1) Liaise with industry experts (see I.1)

Work item	Title	Priority H-high M-medium L-low	Next milestone	Start Date	End Date	Status P-planned O-ongoing C-completed S-Superseded	Contact Person(s)	Related Pubs / Standard	Remarks
F.1	Develop and maintain a product specification for dynamic application of tides in ECDIS	H	Prepare draft Product Specifications (S-1xx) for tidal data in S-100. Prepare draft Portrayal model for tidal data in S-100.	2009	2017	O	Zarina Jayaswal* Glen Rowe Jimin Ko Peter Stone* Zarina Jayaswal		Establish joint project teams as required. Liaise with S-100WG (see H.1) Liaise with industry experts (see I.1)
G.1	Liaise with S-100WG on tidal and current matters relevant to ECDIS applications	H		-	Permanent	O	Gwenaële Jan Kurt Hess Louis Maltais		Establish joint project teams as required.
H.1	Liaise with industry experts on the development of product specifications for tides and currents	H		-	Permanent	O	All		
I.1	Maintain an inventory of tide gauges and current meters used by Member States and publish it on the IHO/TWCWG web site.	H		-	Permanent	O	David Wyatt* All		Initial inventory from TWCWG members available on IHO web site.
J.1	Review feedback of on-line real time water level observation document	L		-	Permanent	O	Zarina Jayaswal* All		

Work item	Title	Priority H-high M-medium L-low	Next milestone	Start Date	End Date	Status P-planned O-ongoing C-completed S-Superseded	Contact Person(s)	Related Pubs / Standard	Remarks
K.1	Maintain and extend the relevant IHO standards, specifications and publications	M M	Review wording of IHO Resolution 3/1919, as amended, in light of revised definitions for MSL and LAT	- 2014	Permanent 2015	O O	Gwenaële Jan	IHO Resolutions in M-3 S-60 User's Handbook on Datum Transformations involving WGS 84	
M.1	Develop and maintain material for course on Tides and Currents	H	Delivery in 2015	-	Permanent	O	Ruth Farre* Louis Maltais Peter Stone Zarina Jayaswal		Adapt currently available course material to create a course suitable for delivery in support of CBSC requests

Meetings (Task L)

Date	Location	Activity
25-28 Mar 2014	Wollongong, Australia	TWLWG-6
3-5 Jun 2014	Quebec City, Canada	SCWG-2
21-24 April 2015	Silver Spring, Maryland, USA	TWLWG-7
13-15 May 2015	Tokyo, Japan	SCWG-3
2016 (TBD)	TBD	TWCWG-1

Chair: Gwenaële Jan (France)
Vice Chair: Louis Maltais (Canada)
Secretary: David Wyatt

Email: gwenaele.jan@shom.fr
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Tides, Water Level and Currents Working Group
??, Brazil – 25-29 April 2016
Draft Agenda – (TWCWG 1)

1 Opening

- .1 Opening address by the Chairman
- .2 Address by host nation
- .3 Welcome by the IHB

2 Administrative Arrangements

- .1 Adoption of the Agenda and Apologies – Chair/Secretary
- .2 Programme and timetable of the Sessions – Chair/Secretary
- .3 Meeting administration, including H&S – Host
- .4 Report on Intercessional Activities including HSSC 7 – Chair
- .5 Matters arising from TWLWG 7, SCWG 3 and Review of Action Items – Secretary

3 National Presentations

- .1 Presentations by delegates on “National Tidal and Current Issues”

4 Product Specifications Work Packages

- .1 WP1 Product Specification - Dynamic application of tides in ECDIS {C.1} - (Leader: Australia/Participants: All) – Australia
- .2 WP2 Real time data transfer format - Standard for the transmission of real time tidal data {C.2} - (Leader: UK/Participants: All) – UK
- .3 WP3 Gridded product (Leader: USA/Participant: All) – USA
- .4 WP4 Surface Current Product Specification - Navigationally significant surface current - (Leader: USA/Participants: All) – USA

5 Product Specification Presentations

- .1 Surface Current Product Specification (S-111)
- .2 Dynamic Water Level Data Product Specification (S-112)
- .3 Tidal Height Product Specification (S-1xx)

6 Programme Matters

Note:{xx} indicates TWCWG Work Plan reference

- .1 Standard Constituent List {A.1} – UK
- .2 Standard for digital Tide and Current Tables {B.2} – USA
- .3 Inventory of Tide gauges and Current meters used by IHO Member States {F.1} – IHB
- .4 The study of long term data sets for the determination of global sea level rise. {H.1} – UK, Norway, USA & Spain
- .5 Compare Tidal Predictions generated as a result of analysis of a common data set by different analysis software {A.2} – USA
- .6 Establishment and Maintenance of VRF for High Resolution Bathymetric Surfaces {E.1 – E.3} – UK and ??
- .7 Exchange of Harmonic Constants / Predictions – UK
- .8 Determining ellipsoidal height of MSL at the coast – All
- .9 Actual Tides On-line Link status – All

7 IHO Resolutions and Charting Specifications

- .1 Review of relevant IHO Resolutions – IHB
- .2 Review of relevant IHO Charting Specifications – IHB

8. IOC/GLOSS Programme

- .1 Update on IOC/GLOSS Programme items and events – GLOSS/IHB

9. Capacity Building

- .1 Tides and Water Levels Workshop training material

10. Work Plan and ToRs

- .1 TWCWG Work Plan up-dates – IHB
- .2 Review TWCWG ToRs and RoPs – IHB
- .3

11 Any Other Business

- .1 Conduct for future meetings
- .2 SCPT ToRs and RoPs – IHB
- .3 SCPT Work Programme – IHB

12 Venue and dates of the 2nd TWCWG Meeting (TWCWG2)

13 Review of Action Items from TWCWG1

14 Draft Report to HSSC 8/Draft Agenda for TWCWG2

15 Closing remarks