HSSC 6-xxx

6th IHO-HSSC Meeting

Report of the Tidal and Water Level Working Group

Submitted by:	Chairman, TWLWG
Related Documents:	Report of TWLWG 6 meeting (available from IHO web site).
Related Projects:	None

Chair:	*Gwenaële Jan, France*
Vice-Chair:	*Christopher Jones, UK*
Secretary:	*David Wyatt, IHB*
Member States:	*Australia, Brazil, Canada, Chile, China, Cuba, Denmark, Ecuador, Egypt, Estonia, Finland, France, Germany, India, Indonesia, Italy, Japan, Korea Rep of, New Zealand, Norway, Peru, Portugal, South Africa, Spain, UK, Uruguay, USA, Venezuela.*
Expert Contributor Organisations:	*Bohdan Pillich (Tidal Expert)* IOC-GLOSS
	see Annex A for full details

Meetings Held During Reporting Period
TWLWG 6 25 - 28 March 2014, Wollongong, Australia

Next Meeting
TWLWG 7 21-24 April 2015, Silver Spring, MD, USA

Work Program

The 6th meeting at the Australian Hydrographic Office, Wollongong, Australia from 25 to 28 March 2014.and was hosted by the Royal Australian Navy (RAN) Hydrographic Service. The meeting was attended by 16 representatives from 9 IHO Member States, the IHB and expert contributors from Australian National Tidal Centre (Bureau of Meteorology) and OMC International.

A number of national presentations were given, covering a variety of topics – work in the Baltic region to establish a pan-Baltic datum and align it with S-100 Product Specifications, the AusCoastVDT (Vertical Datum Transformation) tool, which is focused on connecting all datums in use, the tides and sea level variations in the Arctic, the organization and structure of Land Information New Zealand (LINZ) and the Hydrographic Authority (NZHA), the TideBed, a database of relations between tide datums and the Bathyelli, GNSS reference heights used to generate vertical reference data for bathymetry reference surface creation.

The TWLWG discussed the Standard Constituent List and the on-going work to undertake analysis to provide 7 decimal places to improve the accuracy of the data; a standard for digital tide tables, where a need was identified to document the standard display formats on what minimum information should be provided; the study of long term data sets for the determination of global sea level rise and the on-going efforts to recover historical data sets; the comparison of tidal predictions generated from the analysis of common data sets using different analysis software; and the establishment and maintenance of vertical reference frameworks for high resolution bathymetric surfaces.

A full day was set aside to work on the dynamic application of tides in ECDIS as well as a standard for the transmission of real-time tidal data. It was noted that considerable independent progress had been made on standards for the transmission of data and it was agreed that the next step should be to focus on ensuring consistency and compatibility of the data sets. The main effort was directed towards determining metadata requirements from a user perspective and the format of the user interface for the display of dynamic tides.

It was agreed to create two correspondence groups (CG) to progress the identified tasks and to generate initial drafts for presentation to HSSC 6. The main tasks were: S-100 Product Specification – provide initial draft

Product Specification for comment, noting terms included in the registry need to maintain their HD definitions and Portrayal model – provide initial draft ideas on portrayal and how to progress with areas between tide/water level stations. It is requested this PS is now allocated a number.

The opportunity was taken to hold a joint afternoon session with the Data Quality Working Group (DQWG), that was also meeting in Wollongong at the time, to discuss Dynamic Underkeel Clearance (DUKC), taking guidance and input from an Australian-based expert contributor from industry - OMC International, who gave a presentation on products and models that the company has provided for a number of critical straits and port areas around the world.

The TWLWG received a background brief on the work being undertaken in the North Sea to derive LAT from a vertical reference shallow water model and make an assessment of the uncertainty for safety. It was agreed there was a need to review the wording of the IHO Resolution 3/1919, as amended, and the associated definitions of MSL and LAT.

Revised wording for the definitions Mean Sea Level (MSL) and Lowest Astronomical Tide (LAT) for tidal and non-tidal areas (Annex C) were discussed. Final draft versions were agreed and these have been submitted to the Hydrographic Dictionary Working Group (HDWG) for presentation to the 6th meeting of the Hydrographic Services and Standards Committee (HSSC6) for endorsement prior to seeking the formal approval of IHO Member States. The review into IHO Resolution 3/1919, as amended, (Datums and Benchmarks) remains on-going.

Work to develop a generic tides and water level course for delivery as part of the IHO Capacity Building programme was commenced, material used in various similar courses was identified. Outline course details were provided and a method to collate the available material into a suitable generic course was agreed.

The draft Work Plan, attached at Annex B, was discussed and agreed.

SCWG Chair and TWLWG Chair began ongoing discussions on both technical items and merger strategies. It has been decided to hold the SC Working Group/Project Team meeting as scheduled in 2015, and invite TWLWG members, and likewise, to hold the TWLWG meeting and invite SCWG members. Full integration would occur in 2016.

Progress on HSSC Action Items

The task 5.8 Under keel clearance was identified as to be reported to HSSC6.
"HSSC5/52 TWLWG to take note of and liaise with the Malacca and Singapore Straits Marine Electronic Highways (MEH) project, regarding the under keel clearance monitoring system. TWLWG-6"

From TWLWG6 (2014/04), the contact has been made with the Maritime and Port Authority of Singapore who are involved in the Malacca and Singapore Straits Electronic Highways project. Discussion is ongoing. Progress has been done on the following points.

- Development of a first draft Product Specification for Dynamic Water Level:
    TSMAD is currently working on a first draft of a Dynamic Water Level Data Product Specification which will focus on the use of AIS messages to transmit tidal data suitable for use in any proposed dynamic tide application. It will involve researching the current practices already used; including those used by the Maritime and Port Authority of Singapore within the Malacca and Singapore Straits Marine Electronic Highways (MEH) project and will investigate the potential expansion of S-100 to accommodate AIS messages.

- Description on the AIS messages currently used and received by vessels;

The first outcomes are that in the MMSI number for each tide gauges the latitude and longitude of the tidal station into the AIS message are incorporated. This also allows to filter the tide gauges data that are coming in from an AIS base station.

- Portrayal of real time tidal information via AIS on ECDIS or other navigational system;

To the question about the way how, currently, the vessels receiving AIS messages are explored on the portrayal of real time tidal information via AIS on ECDIS or other navigational system. The real time information can be view via a website hosted by marine ports (Works in Progress on full implementation).

Problems Encountered

For the work plan C.1 (a), Annex B, a draft tidal product specification has commenced. It has been raised by the sub working group members that not all are familiar with S-100 and some do not have access to the ISO standards to be able to make useful contributions. This leads to the request that someone with more experience with S100 and ISO standards be part of the sub working group to help guide the process.

Any Other Items of Note

From interactions with the DQWG, it has been raised that "regarding the provision of data quality indicators on tidal predictions a discussion was held with the TWLWG. The DQWG members felt that the uncertainty value was only needed in the vertical sense (i.e. what is the probable error in height of a tidal prediction) such that this could be added into any UKC. The TWLWG members felt that uncertainty should be added to both vertical and time (to cater for those predictions which are correct in height but are out of phase)". Further discussions are needed to precise and specify how such uncertainties could be used.
The SCWG Chair raised the point about the usefulness of consulting the TWLWG on establishment of common vertical datums for currents referenced to a water level and also, transmission of real-time data.

Conclusions and Recommended Actions

Dynamic Application of Tides in ECDIS: Work on specification of dynamical tides in future products will be one of the big issue of the TWLWG in the working plan (Annex B). It concerns 4 work packages (WP): WP1 Product specification (working with TSMAD and DQWG on S-100 and the quality level of the metadata to define for water level and current fields in the future product), WP2 working on real time data transfer format, WP3 working on gridded product and WP4 working on Tidal current. All these 4 WP are under progress

Recommendations for WP1 and WP2: Task C1 of the work plan C.1 (a), Annex B, lead to the request that someone with more experience with S-100 and ISO standards be part of the sub working group of TWLWG to help guide the process.

For WP4: In 2015, the TWLWG and SCWG organisation will increase the exchange with SCWG on the items of the common vertical datums for currents referenced to a water level and on the transmission of real-time data.

Justification and Impacts
N/A

Action Required of HSSC

The HSSC is invited to:

a. note this report
b. re-appoint the TWLWG to continue its work under its current Terms of Reference
c. Consider allocation of a number to the dynamic tides PS
d. approve the draft definitions of MSL and LAT for submission to IHO Member States at Annex C
e. endorse the draft Work Plan at Annex B

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1 TWLWG Work Plan

1.1 TWLWG Tasks

A Maintain Standard Tidal Constituent List (IHO Work Programme 3.2.4 refers)

B Prepare a Standard for Digital Tide Tables (IHOTC Report to the XVIIth IHC as adopted)

C Liaise with TSMAD on tidal matters relevant to the Dynamic Application of Tides in ECDIS and develop a Standard of the transmission of real-time tidal data (Action HSSC1/18)

E Review the various definitions of MSL and their relevance to Hydrographic Offices and review the IHO tidal resolutions to ensure that they are compatible with the requirements of non-tidal areas such as the Baltic Sea.

F Prepare and maintain an inventory of tide gauges used by Member States and to publish it on the IHO/TWLWG web site.

H Compare the tidal predictions generated as a result of analysis of a common data set using different analysis software.

I Develop and maintain material for course on Tides

Task	**Work item**	**Priority** H-high M-medium L-low	**Milestones**	**Start Date**	**End Date**	**Status** P-planned O-ongoing C-completed	**Contact Person(s)** * **indicates leader**	**Related Pubs/Standard**
A.1	Maintain Standard Tidal Constituent List	H	Review current list of published tidal constituents	Continuous		O	Chris Jones*	
A.2	Compare the tidal predictions generated as a result of analysis of a common data set using different analysis software.	H	Select Common data set Analyse using different software Predict common set of tides Compare results	Continuous		O	Stephen Gill* All	
B.2	Prepare a Standard for Digital Tide Tables	H	Prepare draft Standard	2009	2015	O	Stephen Gill* Chris Jones Zarina Jayaswal	

Task	**Work item**	**Priority** H-high M-medium L-low	**Milestones**	**Start Date**	**End Date**	**Status** P-planned O-ongoing C-completed	**Contact Person(s)** * **indicates leader**	**Related Pubs/Standard**
C.1	Liaise with TSMAD and DIPWG on tidal matters relevant to the Dynamic Application of Tides in ECDIS	H H	Prepare draft Product Specifications (S-1**) for tidal data in S-100. Prepare draft Portrayal model for tidal data in S-100.	2010 2012	2015 2015	O O	Zarina Jayaswal* Glen Rowe Bill Mitchell Kwang-nam Han Stephen Gill* Bill Mitchell Zarina Jayaswal	S-100 S-100, S-102
C.2	Develop a Standard for the transmission of real-time tidal data	H		2009	2015	O	Chris Jones* All	
E.1	Review the various definitions of MSL and their relevance to Hydrographic Offices and review the IHO tidal resolutions to ensure that they are compatible with the requirements of non-tidal areas such as the Baltic Sea.	H H	IHO Resolution 3/1919, as amended, approved by HSSC 5. Required reviewed of definitions of MSL and LAT for submission to HDWG Review wording of IHO Resolution 3/1919, as amended, in light of revised definitions for MSL and LAT	2009 2014	2014 2015	C O		IHO Resolution 3/1919, as amended.
F.1	Prepare and maintain an inventory of tide gauges used by Member States and to publish it on the IHO/TWLWG web site.	H	Initial inventory from TWLWG members available on IHO web site. CL36/2010 sent to Member States seeking wider input.	Continuous		O	David Wyatt* All	

Task	**Work item**	**Priority** H-high M-medium L-low	**Milestones**	**Start Date**	**End Date**	**Status** P-planned O-ongoing C-completed	**Contact Person(s)** * **indicates leader**	**Related Pubs/Standard**
H1	The study of long term data sets for the determination of global sea level rise.	H		Continuous		O	Stephen Gill* All	
I1	Develop and maintain material for course on Tides	H	Adapt currently available course material to create a course suitable for delivery in support of CBSC requests	2013	2015	O	Stephen Gill* Bill Mitchell Ruth Farre	

1.2 TWLWG Meetings (IHO Task 3.1.11 refers)

Date	**Location**	**Activity**
14 – 16 May 2013	Helsinki, Finland	5th Meeting
25 – 28 March 2014	Wollongong, Australia	6th Meeting
21 – 24 April 2015	Silver Spring, Maryland, USA	7th Meeting

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Vice-Chair: Christopher Jones Email: christopher.jones@ukho.gov.uk
Secretary: David Wyatt Email: adso@iho.int

HYDROGRAPHIC DICTIONARY DEFINITIONS

1. Proposed revised definition for Mean Sea Level (MSL) in line with IHO Resolution 3/1919, as amended, was finalized at TWLWG 6:

Current version:

Mean Sea Level: The average height of the surface of the sea at a tide station for all stages of the tide over a 19-year period, usually determined from hourly height readings measured from a fixed predetermined reference level (chart datum).

Proposed:

Mean Sea Level: The average height of the surface of the sea at a water level station, determined from height readings measured over an appropriate period of time from a fixed predetermined reference level (chart datum).

2. It was agreed a new term was required to cover monitoring/measuring stations in non-tidal areas; the proposed definition for a Water Level Station was generated at TWLWG 6:

New Term:

Water Level Station: A place where water level observations are obtained. It is has continuous observations available for a sufficient number of years to determine the characteristic features for the locality.