Minutes
24th Meeting of the North Sea Hydrographic Commission Tidal Working Group (NSHC TWG 24)

27th September 2022

For reference, see the 'provisional*' NSHC TWG website. This meeting was recorded; the recordings can be found here: Session 1, Session 2, Session 3.

more details later in this report on the location of a 'home website' going forward under **Review the Provisional NSHC TWG Website*

Participants (See also Annex A)

Belgium (BE)	– Johan Verstraeten
Denmark (DK)	– Giuseppe Masetti
Denmark (DK)	– Nicki Riber Andreasen
Denmark (DK)	– Ole Baltazar Andersen (afternoon session only)
France (FR)	– Gael Andre (introduced in the WG)
France (FR)	– Gwenaële Jan
Germany (DE)	– Andreas Boesch
Iceland (IS)	– Níels Finsen (in place of Árni Þór Vésteinsson)
Netherlands (NL)	– Ronald Kuilman
Netherlands (NL)	– Thijs Ligteringen
Norway (NO)	– Aksel Voldsund
Sweden (SE)	– Thomas Hammarklint (Chair)
United Kingdom (UK)	– Chris Jones
Ireland (IE)	– Sean Cullen not in attendance

Opening / Welcome

- Mr. Thomas Hammarklint (SE), Swedish Maritime Administration (SMA) and Chair of the NSHC Tidal Working Group, opened the meeting at 0910 CEST and welcomed all participants.
- He mentioned it was only his second NSHC TWG meeting, and first as Chair, and so asked for full engagement from all participants and assistance from those with more experience within the group's history, in terms of the ongoing action items etc.
- All other participants introduced themselves in a 'round table' session.

Appointment of a Secretary for the meeting

- UK volunteered to act as Secretary for the meeting.

List of Participants

- The List of Participants was reviewed and accepted.
- See Annex A and also '**Updates to the List of Members'** later in the report.

Programme

- SE (Chair) went through the programme of activities for the day. See Annex B.

Adoption of the Agenda

- The latest version of the Agenda was discussed and then adopted without further amendment. See Annex C.

Review of Actions

Minutes of the 23rd NSHC TWG Meeting (5-6 February 2020, Reykjavik, Iceland)

- The minutes of the last (23rd) NSHC TWG23 were displayed by The Chair and were briefly discussed. No amendments or questions arose, and so the minutes were approved and accepted by the group.

List of Actions from NSHC34 Meeting (27-28 April 2021, VTC) [those relevant to NSHC TWG]

No/year Agenda item	Subject	Action	Who	When	Status
8/2021 B.10	Risk Assessment	Need of a funded clarification for the use of 1% of LAT as the norm;	TWG	35th NSHC	
6/2016 B.5	Vertical reference (LAT) comparison	Continue to investigate and reduce the differences between the LAT along boundaries in accordance with the action items of TWG WP 18/1. Publication of those differences is paused until the outcomes of the investigations are available.	Chair TWG	NSHC 34	Different approach on this matter has been endorsed. AP maintains OPEN until the Tidal WG closes this AP.
7/2016 B.5	Work plan TWG	Consider the validity of a 1% norm from different user perspectives and report back to NSHC.	Chair TWG	33rd NSHC	**Closed**

legend	
White	**Open** (action) item
Light grey	**Continuous** (action) item
Light green	**Completed or Closed item**

List of Actions from NSHC35 Meeting (5-6 April 2022 Reykjavik, Iceland)

No/year Agenda item	Subject	Action	Who	When	Status
15/2022 D.4.2	TWG	Permanent chair for TWG to be chosen per correspondance. SE (Thomas Hammarklint) serves as Chair until permanent chair elected.	Chair	NSHC36	Ongoing
8/2021 B.10	Risk Assessment	Need of a well-founded clarification for the use of 1% of LAT as the norm;	TWG	NSHC35	Ongoing. Passed on to NSHC36
6/2016 B.5	Vertical reference (LAT) comparison	Continue to investigate and reduce the differences between the LAT along boundaries in accordance with the action items of TWG WP 18/1. Publication of those differences is paused until the outcomes of the investigations are available.	Chair TWG	NSHC 34	Different approach on this matter has been endorsed. AP maintains OPEN until the Tidal WG closes this AP.

legend	
White	**Open** (action) item
Light grey	**Continuous** (action) item
Light green	**Completed or Closed item [deleted from this list]**

- The list of actions from NSHC35 was published very recently (12th September 2022).
- **Action 15/2022 D.4.2** – In short, the TWG agreed it was preferred to have a permanent Chair, with Member State comments reflecting having a permanent Chair could help promote more active collaborative working within the group.
    - The TWG needs to submit its report no later than 6 weeks prior to the 36th NSHC meeting (to be held 29-30 March 2023 by VTC). This means the next (25th) NSHC TWG meeting will need to occur in early February 2023; and before this time a new and permanent Chair needs to be elected (we do not have to elect them now at this meeting).
    - See **Election of Permanent Chair** later in this report for discussion on this item.
- **Action 8/2021 B.10** – addressed later under **Presentations and Discussions**
- **Action 6/2016 B.5** – addressed later under **Presentations and Discussions**

New Work Plan (WP) Item - *Co-ordination & Implementation of the S-100 Roadmap in the North Sea*

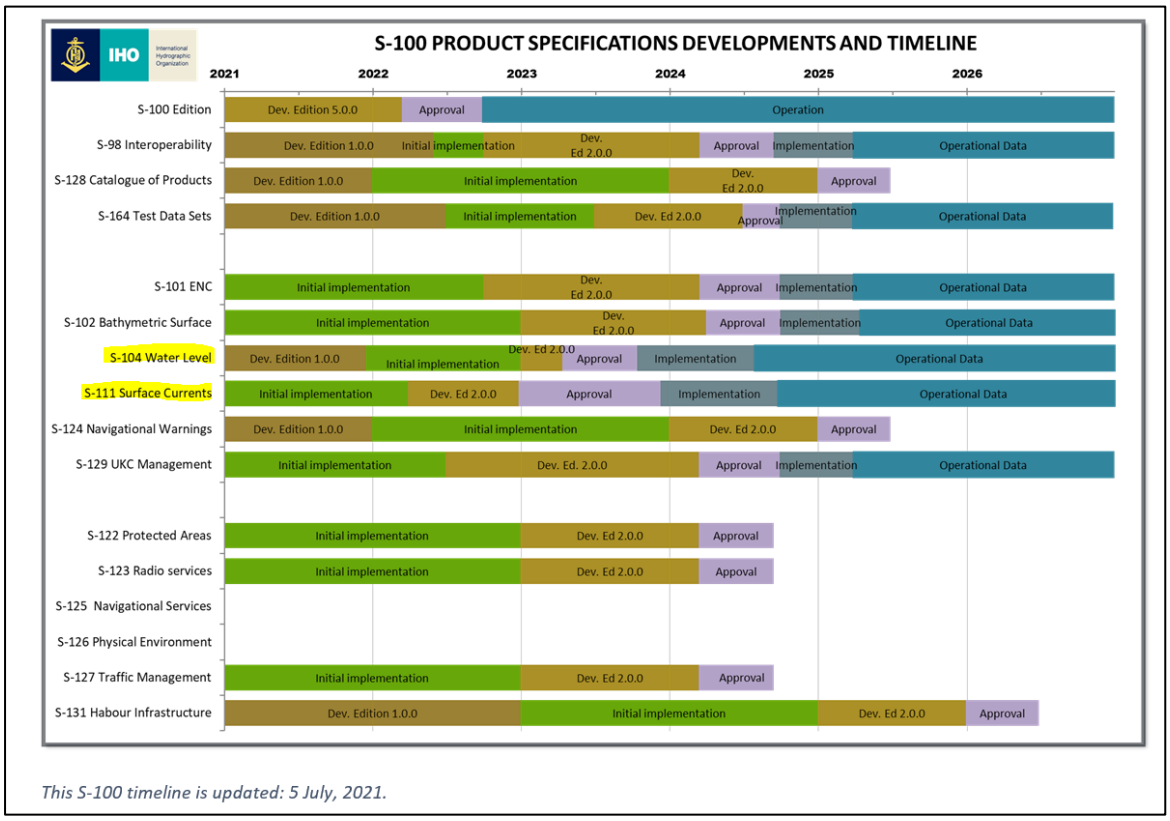
- Although not tasked as a specific Action Item from NSHC35, the TWG considered the details contained in the NSHC35 Report Minutes, specifically:

> **C. IHO Work Programme 2 – "Hydrographic Services and Standards"**
>
> **C1. HSSC - items relevant to NSHC (incl. S-100 Roadmap Implementation)**
>
> DE: We should make some steps to interregional coordination which is already proposed by the IRCC. This can follow the existing coordination with paper charts.
>
> Would it be feasible to task this to TWG and come up with an idea and propose a way forward for regional cooperation for S-111?
>
> FR: I believe we talk about tidal currents because these are the main currents we have in our areas. I think we can choose the tidal models to use in different areas.

- Therefore, the group agreed to add '***co-ordination & Implementation of the S-100 Roadmap in the North Sea***' within its Terms of Reference (TOR), as well as a new Work Plan Item.
- NSHC TWG proposes this specifically relates to S-104 & S-111 for the North Sea region.
- The NSHC TWG group agreed they could consider comparing S-104 & S-111 data at the national boundaries, identify any differences and work collaboratively to resolve them.
- It was discussed that IHO TWCWG is responsible for development of the Product Specifications.
- The work of the Worldwide ENC Database Working Group (WENDWG; https://iho.int/en/wendwg) needs to be considered in terms of the WEND-100 principles.
- The TWCWG Website for sharing of S-104 & S-111 data sets is here: https://iho.int/en/miscellaneous-6
- The Republic of Korea (KHOA) viewer is here: https://github.com/S-100ExpertTeam/khoa-s100-viewer.
- The IHO S-100 Web Viewer (developed by KHOA) is here: http://119.195.114.103/webview

This topic generated much additional discussion.

- SE (Chair) mentioned their Interreg Baltic Sea Region programme (https://interreg-baltic.eu/), which will involve S-104 & S-111, (& S-102, S-101). They will work with a Meteorological Institute, including the coarse models from Copernicus (and work to improve the resolution).
- UK mentioned a collaboration between UKHO and Shom to investigate S-111 across the whole La Manche / English Channel.
- BE asked about the projected timelines for implementation of S-104 & S-111 for the NSHC region; details can be found on the S-100 Implementation Strategy website here: https://iho.int/en/s-100-implementation-strategy#:~:text=Following%20the%20endorsement%20of%20the,Action%20C4%2F19%20refers). FR confirmed the dates shown in the below timeline (sourced from the IHO website).



- FR – suggested an action on NSHC TWG to create a guideline / test plan, detailing the key issues concerning S-104 datasets at national maritime boundaries; what do we need to be able to test these two product specifications in the NSHC region?
- FR clarified this as follows: the idea is to take the outputs and recommendations and guidelines of the TWCWG-IHO regarding to S-104 and build among TWG, a list of associated actions for the generation of S-104s produced by TWG hydrographic offices. Several steps are possible: Encoding water level in S-104 could be one of the targeted exercises.
- DE – suggested creating a list of what each Member State is doing, their timelines, test data sets – maybe to use the TWCWG and other 'facilities' that already exist for this (see above).
- SE – suggested we could ask for further guidance from NSHC if the group feels it needs more clarification on what is expected of the NSHC TWG.

See also:

- **Review of TOR's - Annex D**
- **Work Plan - Annex E**
- **List of Actions - Annex F**

Tidal Data Rescue & Data Archaeology

- FR raised the topic of tidal data rescue and asked if this should this be an ongoing discussion item of the NSHC TWG. FR suggested that the sharing of information between nations on methods of data rescue, and even the data itself, for research and scientific exchange.
- The group agreed this was a relevant topic for continued discussion.
- **Work Plan item**; Permanent and for ALL Member States; to discuss and report on national activities for Sea Level Archaeology and Data Rescue, plans and procedures.

Presentations and Discussions (all presentations are available here)

- FR (Gwenaële Jan) presented the vertical reference surfaces (BathyElli), detailing their work to release version 2.0 of the product. BathyElli outputs are publicly available – see www.data.shom.fr. Both LAT and CD are modelled within the system, and this data is used in the comparison of reference surfaces at the national boundaries. FR also described their Sea Level Observation Network (RONIM) and gave a detailed overview of the work Shom have done relating to Data rescue (the topic which was discussed separately as detailed above).

- NO - Aksel Voldsund presented some recent national developments, including their decision to encourage users of their services to visit the Norwegian Hydrographic Service website to obtain either astronomical predictions, or water level forecasts, depending on the user need. They have removed the 'single source' paper Tide Table in order to endorse this approach. The presentation included details of a re-analysis of the latest 15 years of tidal data at key NO sites, updates to their vertical datum separation models, future plans for investigating the benefits of using new high resolution hydrodynamic models, and also upgrades to their existing tide gauge network.

- SE (Chair) presented the important work of the Baltic Sea Chart Datum WG (CDWG), its history, culminating in the development of the recent BSCD2000 vertical reference level used as CD across the whole region (and national realizations that conform to it). The main aim being defining a level of CD which is 'close' to "MSL" but which doesn't change over time (therefore a Geoid), so not affected by MSL rise and land uplift. Clear details were given about the 'education' for the mariner (i.e. not 'stealing water'!; the water level remains the same). See https://www.bshc.pro/working-groups/cdwcwg. The group has also recently been tasked with implementing the IHO products S-104 (Water Levels) and S-111 (Surface Currents) across the Baltic Sea region. The FAMOS infrastructure was explained, and mention was also made of a Deltares-coordinated project to connect all tide gauge networks in Europe to the European Vertical Reference System (EVRS), under a EUROGOOS initiative. Discussions followed this presentation about the 'geo-political' situation, i.e. the need (and success) of co-ordinating several countries' collaborating for the common goal and to move away from individual approaches in the past.

- NL (Thijs Ligteringen) gave a detailed update of the ongoing primary action item of the NSHC TWG, i.e. the LAT differences on the North Sea. He summarised the history of the work done so far and each Action Item to which it related. The latest discussion (at NSHC TWG23 in Iceland) centred around the "difference statistic" of the 1% norm, which has since been returned to the group by NSHC for further consideration under Action Items 8/2021 B.10 and 6/2016 B.5. Thijs outlined the updated datasets received from DK, DE and NL (with UK, NO, BE and FR unchanged) and provided the resulting updated comparisons along the national boundaries. In summary, the differences were reduced for several boundaries through the new datasets. There are still larger differences between UK and FR evident in The Channel which will require more investigation. UK suggested that the differences may, in part, be related to the fact that both UK and FR identify CD as a separate surface to LAT and the bathymetry on the nautical charts is reduced to CD in that region. FR identified the following potential points of difference:
    - the source of the bathymetry,
    - the number of in situ observations used to subtract the tidal range and access the LAT,
    - and how to reduce the observed water height in the English Channel, where the surge regularly reaches 0.80 m.

FR pointed out that in 2020 an updated version providing BathyElli v1.0 data was sent to the TWG. This dataset allows to cover the northern part of the FR domain at the junction with Belgium. The comparison results between the different LATs should be able to use this updated version.
Action: UK and FR to consider supplying 'CD to Ellipsoid' separation values along their common boundary to NL to investigate if this improves the result in any way.
Action: NL to provide the TWG with a list of the sources to the relevant treaties and lists of coordinates that were used for the analysis (including the coordinate reference system).
DK (Ole Baltazar Andersen) suggested he could provide NL with his latest version of a LAT model for the entire NSHC region (this new model uses 280 harmonic constituents in calculating LAT and has been developed utilising the FES2014b (LEGOS) global model).
A few additional questions were asked to DK (Ole Baltazar Andersen) about the DK LAT model: where to download the model data (answer: by private email to Ole Baltazar Andersen), the availability of research papers describing the model creation (not available at the moment), the verification of the estimated uncertainty (ongoing efforts).
DE asked whether the LAT values in the model matches with the LAT calculated by Danish Meteorological Institute (DMI) at the tide stations. DK (Ole Baltazar Andersen) answered that they do not match because they are calculated based on different time lengths.

- NL (Ronald Kuilman) presented on the 'measurement statistics' used in the comparison of the LAT surfaces (as already presented by Thijs Ligteringen). He explained the 'currently used' 1% norm (the LAT difference between the two surfaces being compared, divided by the depth at that position). He displayed a matrix of depths (ranging from 1m to 50m) showing the maximum difference in LAT between two Member States LAT surfaces and the "percentage of the depth" shown alongside them. Results greater than the 1% norm were showed in red, and less than 1% norm in green. Ronald then went on to describe a new proposal of measuring the differences using the Total Vertical Uncertainty (TVU), as described in the IHO S-44 Standards for Hydrographic Surveys. He demonstrated how using TVU of 95% for 'special order' and 'order 1a and 1b' could possibly be used to describe the differences more 'intelligently'; that the original 1% norm was arbitrarily chosen and the TVU method has more of a basis as it is described in S-44. It also results in LAT differences being more accepted in shallow waters. He finished by posing the questions if the group wished to define a new norm or continue to reduce the differences (or do both). And if a new norm is decided, will it be the 'TVU' norms so described?
  This generated questions from DK (Giuseppe Masetti) about considering adjusting the 'default percentages' used in S-44 to something more meaningful for this task. DE concurred with this idea. DK and DE noted that the LAT model should only allocate a certain fraction of the TVU budget, because it is just one of several error sources in the hydrographic surveying process. DE suggested that delegates should consult with their national surveying groups and make suggestions for a practically meaningful percentage of the TVU (as defined in S-44) that can be 'reserved' for the LAT model.

- DE – Andreas Boesch presented on the Differences of Overlapping parts of German, Dutch and Danish Chart Datum Surfaces (so the focus here is more about the overlapping parts of the data sets, not the 'hard border'). He showed results comparing Germany with Netherlands and Denmark, and explained the conversion that first needed to occur with the German dataset, which is originally related to the vertical reference frame on land (Normal height zero, 'Normal Null'), in order to re-reference it to ellipsoidal heights. This was done by using the German Quasigeoid 2016 for German waters and the European Gravimetric Geoid (EGG) in the Dutch and Danish regions. There was evidence of a step in the data in the overlapping regions.

Any Other Business

- NIL mentioned the Approximate LAT project that was recently carried out for the Port of Rotterdam. The Port of Rotterdam had a demand to make (Approximate) LAT available in the entire harbour area. The problem however was the spatial resolution of the Dutch NLLAT2018 matrix (circa 600x600 meter). Port of Rotterdam, Rijkswaterstaat and the Netherlands Hydrographic Office developed a 'ALAT-NAP' matrix in a 50x50 meter resolution that connects LAT (used at sea), NAP (used on land and for inland shipping) and the ellipsoid in any place in the harbour. The ALAT-NAP difference was determined at tide stations throughout the harbour and interpolated using the knowledge of the three parties involved. More information (including a two-minute explanatory film) can be found on the website of the Port of Rotterdam (https://www.portofrotterdam.com/en/up-to-date-information/weather-tides-and-water-depth). If members of this group are interested, the Netherlands are happy to help by sharing more information or the ALAT-NAP-ellipsoid matrix (not publicly available).

Election of Permanent Chair

- This was not decided during this meeting. But as mentioned earlier in this report, the group agreed it should be done.
- **Action** – those who wish to be considered for Chair of NSHC TWG should e-mail Thomas Hammarklint (thomas.hammarklint@sjofartsverket.se) **by 30th December 2022**.
- To note; this will be a position lasting for the next 5 years.

Updates to the List of Members

- DK - will send SE the details of the new member (Nicki)
- FR – Gael Andre to be added to the list of participants
- IRL – SE to send an e-mail to Sean Cullen to ask if he is still the IRL rep.
- IS – It is still planned to be Árni Þór Vésteinsson as the main representative for Iceland.

Review the Provisional NSHC TWG Website

- SE mentioned the 'old' website (www.nshc.pro) is no longer working.
- The current website has been created by SE at http://www.bshc.pro/working-groups/twg as part of the BSHC webpages. This will need to be moved soon (Amazon WS to be closing it down) to https://www.bshc.pro/working-groups/twg.
- DE– volunteered to contact the BSH rep to ask for assistance re: the 'nshc.pro' website.
- DK – raised the question of using GitHub? The IHO does support use of the GitHub environment (https://github.com/iho-ohi). It was thought that as GitHub is 'quite specialist' then maybe a separate NSHC TWG GitHub was not required.

NSHC TWG Report to the 36th NSHC Conference (29-30 March 2023)

- SE will prepare the report presentation and circulate beforehand in good time.
- This will follow the next (25th) meeting of the NSHC TWG (see details below).
- Therefor it is proposed that the NSHC TWG Report to the 36th NSHC Conference will actually be a combination of both NSHC TWG 24th and 25th meetings.

Date & Venue of TWG25 7-8 February 2023

- Possibly a face-to-face meeting
- To be held in Göteborg, Sweden at the SMA

Meeting Closed at 1500 CEST, 27 September 2022.

ANNEX A

TWG24 List of Participants
VTC, 27 September 2022

Country	Organisation	Name	E-mail address
Belgium	MDK	**Johan Verstraeten**	johan.verstraeten@mow.vlaanderen.be
Denmark	GST	**Giuseppe Masetti**	gimas@gst.dk
Denmark	GST	**Nicki Riber Andreasen**	nirib@gst.dk
Denmark	DTU Space	**Ole B Andersen**	oa@space.dtu.dk
France	Shom	**Gwenaële Jan**	gwenaele.jan@shom.fr
France	Shom	**Gael Andre**	gael.andre@shom.fr
Germany	BSH	**Andreas Boesch**	andreas.boesch@bsh.de
Iceland	IHG	**Níels Finsen**	nielsf@lhg.is
Netherlands	NLHO	**Ronald Kuilman**	rb.kuilman@mindef.nl
Netherlands	NLHO	**Thijs Ligteringen**	t.ligteringen@mindef.nl
Norway	NHS	**Aksel Voldsund**	aksel.voldsund@kartverket.no
Sweden[1]	SMA	**Thomas Hammarklint**	thomas.hammarklint@sjofartsverket.se
United Kingdom	UKHO	**Chris Jones**	christopher.jones@ukho.gov.uk
[1] Chair of the Tidal Working Group			

ANNEX B

Program NSHC TWG24
27 September 2022
VTC

	Tuesday **27 September 2022**
Morning	**09:00 Tidal WG Meeting commence** **10:30 Break** **10:50 Tidal WG Meeting continue**
Lunch	**12:20 Lunch**
Afternoon	**13:00 Tidal WG Meeting continue** **Tidal WG Meeting closed at latest 15:00**

ANNEX C

Agenda
NSHC TWG24 Meeting
27 September 2022
VTC

Tuesday 27 September 2022

09:00 - 09:20	Opening, welcoming notes Introduction round Appoint a secretary for the meeting Review the List of Participants Review the Program Adoption of the Agenda	Chair All
09:20 - 10:30	Review the work of the TWG and actions since TWG23 Adoption of the Minutes and Work Plan from the TWG23 Meeting [Photo] Review the List of Actions from the 34th NSHC Conference [Photo] Review the Minutes and List of Actions from the 35th NSHC Conference [Photo] From the NSHC35 Draft Minutes: D4.2 Tidal Working Group (TWG) TWG has been inactive due to Covid-19 restrictions. SE has set a meeting in the coming months. Thomas Hammarklint will take chair at this time. SE suggests a more permanent chair is chosen. To be handled per correspondence, IS will lead this. In order to achieve better continuity in the TWG it was decided that the working group must appoint a permanent chair. It was also decided that the TWG (NSHC's Tidal Working Group) will be tasked to coordinate the implementation of S-104 (Water Level) and S-111 (Surface Currents). Propose amendments to the Terms of Reference Open discussion	All
10:30 - 10:50	Coffee break	

10:50 - 12:20	Presentations and discussions Vertical reference Bathyelli, tide gauges network RONIM and data rescue National presentation Norway Baltic Sea Chart Datum 2000 (BSCD2000)	All Gwenaële, FR Aksel, NO Thomas, SE
12:20 - 13:00	Lunch	
13:00 - 14:00	Presentations and discussions continue LAT differences on the North Sea Differences of overlapping parts of German, Dutch and Danish chart datum surfaces AP 23/01 Define new proposal for the norm connected to S-44	 Thijs, NL Andreas, DE Ronald, NL
14:00 - 15:00	Any other business Election of a permanent TWG Chair (NSHC35 Action) Update the List of Members Review the provisional TWG Website Review the Work Plan and unresolved issues of this meeting TWG Report to the 36th NSHC Conference, 29-30 March 2023 and list of matters to be reported [TWG Presentation] Proposals for the venue and dates of the next meeting (TWG25) Chairman's proposal: TWG25, 7 February 2023 (VTC)	All Chair
15:00	Closing of the meeting	Chair

ANNEX D

NSHC Tidal Working Group Terms of Reference

24 August 2022

To be approved by the NSHC 36th Conference, 29-30 March 2023

Proposed amendments marked in red

As proposed by TWG24 (27 September 2022)

1. Objective

To provide technical advice and promote co-ordination on tidal issues especially within the North Sea Hydrographic Commission (NSHC).

2. Authority

The Tidal Working Group (TWG) is a subsidiary of the NSHC and its work plan is subject to NSHC approval. Subject to approval by NSHC the TWG is especially involved with the regional interpretation and implementation of tidal issues as identified by Tidal, Water Level and Current Working Group (TWCWG).

3. Procedures

a. The TWG should:

1. work according to the agreed NSHC work plan
2. monitor and report the progress of the work plan
3. propose new work plan items for consideration by the NSHC.

To support the identification of new work plan items deemed relevant for the NSHC, the TWG should:

4. liaise with relevant Hydrographic Services and Standards Committee (HSSC) working groups, such as TWCWG.
5. Exchange views and experiences concerning tidal issues like unifying vertical datums, analysis, modelling and related issues like sea level rise and surge.
6. Coordinate the implementation of the IHO S-100 products S-104 Water Level Information and S-111 Surface Currents.

b. The TWG will conduct its business mainly by correspondence. Meetings and workshops should be scheduled as deemed necessary for the accomplishment of the work plan.

4. Composition and Chairmanship

1. The TWG shall comprise representatives of the NSHC Member State and expert contributors if applicable.
2. Decisions should generally be made by consensus, if a majority is required each Member State has one vote.
3. External contributors can contribute to the work plan but are not entitled to vote.
4. ~~The Chair and secretarial support will be from the Member State hosting the meeting.~~ The Chair will be nominated by the TWG and approved by the NSHC Conference.
5. The Chair should monitor and report on the work plan to the NSHC.

ANNEX E

NSHC Tides Working Group
Work Plan and Actions
27 September 2022

To be approved by the NSHC 36th Conference, 29-30 March 2023

Proposed amendments marked in red

Work Plan

Item Number (TWG/Item)	Objective (Why/Priority)	Task Description (What/How)	HO Involved	Status
WP 16/04	Enable GNSS-based tidal reduction and the connection with the vertical datum on land	Follow developments on geoid, MSL and LAT computations for the North Sea area	All	Permanent, see also WP18/01
WP 18/01	Improve North Sea wide realization of reference surfaces	Explain and reduce differences in reference surfaces at the international boundaries	All	Permanent
WP 18/02	Improve methodologies for ERS	Exchange between HO's on operational methodologies for ellipsoidal referenced surveying for GNSS based surveys	All	Permanent
WP 22/01	Ensure common European LAT surface adoption.	Follow the developments of European initiatives on new LAT surfaces.	All	Permanent
WP 24/01	Regional cooperation for S-104 (Water Levels) and S-111 (Surface Currents)	Make available S-104 and / or S-111 test datasets which could be compared at national boundaries in the North Sea region, investigate and collaborate on resolving any differences	All	Permanent
WP 24/02	Data Rescue and Data Archaeology	Exchange between HO's on details and methods used in the rescue of national / international archive tidal & water level datasets, for the purposes of climate change	All	Permanent

		studies, tsunami research and any such activity requiring access to these important assets.		

List of Actions

Item Number (TWG/Item)	Objective (Why/Priority)	Task Description (What/How)	HO Involved	Status	Corresponding Work Plan Item
AP 18/01	Explain differences in realizations of LAT	Exchange on bilateral basis between involved HO's to investigate further the origin of observed differences at the boundaries between national reference surfaces	All	Permanent	WP 18/01
AP 19/03	Make an overview over existing separation and hydrodynamic models, including metadata	Each member state sends the information to UKHO	All, UK	TWG25, Feb 2023	WP 18/01
AP 22/01	Investigate the differences in national LAT reference surfaces at all borders.	Each member state should supply information on how their LAT surface was built to NL who will analyse this information and compare the surfaces.	NL, All	Done	WP 18/01
AP 22/02	Investigate the differences in national LAT reference surfaces at all borders.	Each member state should supply all LAT updates to NL who will update the LAT differences matrix accordingly.	NL, All	Periodical	WP 18/01
AP 22/03	Investigate the differences in national LAT reference surfaces at all borders.	Make error estimates in LAT surfaces.	All	Permanent	WP 18/01
AP 22/05	Ensure common European LAT surface adoption.	Follow the developments of European initiatives e.g. EMODnet on new LAT	All	Permanent	WP 22/01
~~AP 23/01~~	~~Define new norm connected to S-44~~	~~Decide how the arbitrary 1% norm should be redefined to be linked to something practical. Which percentage of the total vertical uncertainty (TVU, as~~	~~All~~	~~TWG25, Feb 2023~~ Closed and	~~WP 18/01~~

		~~defined in S-44) can be allocated by the LAT models? Member states send their suggested values to NL~~		replaced by AP 24/03	
AP 23/02	Investigate all LAT differences at the borders and overlapping parts of surfaces using the redefined norm.	Investigate the differences at all MS borders (and overlapping parts of surfaces) between national LAT reference surfaces.	All	Permanent	WP 22/01
AP 24/01	UK and FR to supply 'CD to Ellipsoid' separation values along their common boundary to NL to investigate if this improves the result in any way.	Charted depths in this region are reduced to 'CD', which is ***approximately*** LAT. Therefore, it is important to ensure the correct surfaces are being compared with each other, then used in the 1% norm calculation (or other suitable method as decided by TWG).	FR, UK, NL	TWG25, Feb 2023	WP 18/01
AP 24/02	NL to provide the TWG with the sources of the maritime boundaries that were used for the analysis of the LAT differences.	Provide the TWG with a list of the sources to the relevant treaties and lists of coordinates that were used for the analysis (including the coordinate reference system).	NL	TWG25, Feb 2023	WP 18/01
AP 24/03	Total Vertical Uncertainty (TVU) norm for comparing differences in LAT surfaces at the national boundaries	Propose suitable refinement (and explanation of the reasons) to the newly proposed norm connected to S-44 by the next meeting (TWG25). "Which percentage of the total vertical uncertainty (TVU, as defined in S-44) can be allocated by the LAT models?" Member states send their suggested values to NL.	DK, DE, NL All	TWG25, Feb 2023	WP 18/01
AP 24/04	Elect a permanent Chair of NSHC TWG	As directed by NSHC; the Chair should expect to be in place for a 5-year minimum term.	All	End Dec 2022	n/a