



**Minutes**  
**25<sup>th</sup> Meeting of the North Sea Hydrographic Commission Tidal Working Group**  
**(NSHC TWG25)**

**7<sup>th</sup> February 2023**

For reference, see the 'provisional' NSHC TWG [website](#). This meeting was recorded; the recording can be found [here](#).

**Participants (See also Annex A)**

Belgium (BE)	– Johan Verstraeten
Denmark (DK)	– Nicki Riber Andreasen
France (FR)	– Gwénaële Jan
France (FR)	– Gael Andre
Germany (DE)	– Andreas Boesch
Iceland (IS)	– Andri Leifsson (in place of Árni Þór Vésteinsson)
Netherlands (NL)	– Ronald Kuilman
Sweden (SE)	– Thomas Hammarklint (Chair)
United Kingdom (UK)	– Colin Sheperd

**Opening / Welcome**

- Mr. Thomas Hammarklint (SE), Swedish Maritime Administration (SMA) and Chair of the NSHC Tidal Working Group, opened the meeting at 0900 CEST and welcomed all participants [[List of Participants](#)].

**Appointment of a Secretary for the meeting**

- NL 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 24th NSHC TWG Meeting (27 September 2022, VTC)

- The minutes of the last (24th) NSHC TWG24 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	35 <sup>th</sup> 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	33 <sup>rd</sup> NSHC	<b>Closed</b>

legend	
White	<b>Open</b> (action) item
Light grey	<b>Continuous</b> (action) item
Light green	<b>Completed or Closed</b> item

### List of Actions from NSHC35 Meeting (5-6 April 2022 Reykjavik, Iceland) [those relevant to NSHC TWG]

No/year Agenda item	Subject	Action	Who	When	Status
15/2022 D.4.2	TWG	Permanent chair for TWG to be chosen per correspondence. 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	<b>Open</b> (action) item
Light grey	<b>Continuous</b> (action) item
Light green	<b>Completed or Closed</b> item [deleted from this list]

- Action 15/2022 D.4.2**
  - The TWG needs to submit its report no later than 6 weeks prior to the 36<sup>th</sup> NSHC meeting (to be held 29-30 March 2023 by VTC).
  - 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**

### Proposed amendments to the Terms of Reference

The TWG members agreed with the proposed changes to add ‘*Coordinate the implementation of the IHO S-100 products S-104 Water Level Information and S-111 Surface Currents*’ within the [TWG Terms of Reference](#).

### Tidal Data Rescue & Data Archaeology

- FR mentioned that it is an ongoing topic, FR refers to an interesting article about data rescue: <https://rmets.onlinelibrary.wiley.com/doi/epdf/10.1002/gdj3.179>

## Presentations and Discussions (all presentations are available [here](#))

- NL (Ronald Kuilman) presented *AP 24/03 Refinement TVU norm - Propose suitable refinement (and explanation of the reasons) to the newly proposed norm connected to S-44 by the next meeting. "Which percentage of the TVU can be allocated by the LAT models"*.

He showed in the first slides that the old 1% norm was arbitrary chosen. In the next slides he showed a refinement of the TVU norm with 2 proposals.

Proposal 1: TVU (S-44 order 1a) against the LAT difference along the maritime boundary.

Proposal 2: ½ TVU (S-44 order 1a) against the LAT difference along the maritime boundary.

The difference in LAT height along the maritime boundary versus the max TVU value S44 Order 1a and 50% of this value were presented in 12 graphs (for all the boundaries on the North Sea). For 10 of 12 boundaries the difference in LAT height is smaller than 50% of Max TVU value Order 1a.

The presentation was followed by an extensive discussion.

SE asked why not to use the 1% norm, when this is easier to understand for the user.

DE said that the NSHC tasked the TWG to link the norm to something practically. The people that actually use the LAT difference in their daily work want to know if the LAT difference between the countries is small enough so that they don't introduce significant errors in the surveying work.

FR notes that it is a common international goal to share the different calculations and to understand why do we have these differences. A good next step is to compare the used bathymetry of the different countries and remove the dynamic part.

DK said that the presented TVU norm was a good starting point.

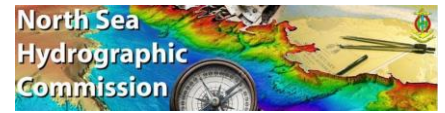
In general, most countries agreed with the proposed TVU norm but would also like to continue to investigate the LAT differences between the countries.

- NL (Ronald Kuilman) presented *AP 23/02: Investigate the differences at all MS borders (and overlapping parts of surfaces) between national LAT reference surfaces*. Two action items: 1) Investigate the differences at all MS borders and 2) overlapping parts of surfaces between national LAT reference surfaces. He showed the LAT to ellipsoid data that was provided by the member states and the overlapping areas of the member states. The question that came up was does the TWG want to compare the LAT surfaces that NL has already received or does the TWG want to compare as much as possible area of the North Sea.

The TWG members liked the idea to compare the LAT surfaces for the largest possible area.

**Action item 25/01:** it has been decided that all TWG members should deliver as large as possible surface to NL who will compare neighbouring surfaces.

- NL (Ronald Kuilman) presented *Development of the 'NAP to Approximately LAT' matrix for the Port of Rotterdam*. He showed the rationale for the project, the construction of the NAP-LAT matrix, the publicity at the Port of Rotterdam and the future maintenance of the NAP-LAT matrix. [Weather, tides and water depth | Port of Rotterdam](#).
- BE (Johan Verstraeten) showed an update of the Belgian activities. In 2023 the Ghent University Geomatics Department starts with the update of the Belgian LAT surface. The running time will be 24 months. He mentioned that there is a regained popularity for results from Blast project (2009-2012) and Danish DNSCO8.



**WP24/01** Regional cooperation for S-104 (Water Levels) and S-111 (Surface Currents).

- FR – France made a test-case for S-104 and S-111, a NETCDF file from a model has been converted to a HDF5 file.
- SE - showed an interesting S-111 viewer [vislab-ccom.unh.edu/~briana/s100/twcwg-s111-test-data.html](https://vislab-ccom.unh.edu/~briana/s100/twcwg-s111-test-data.html).
- DE – are monitoring the work and the progress of the TWCWG, they get a new colleague who will work on the s111 project.
- DK – the developments are in an early stage, good coordination between the various parties is necessary.
- NL – the Netherlands are developing this year a S-111 test dataset + viewer for the harbour of IJmuiden.

**Election of Permanent Chair**

- It has been decided that Thomas Hammarklint will be the chairman at least until the next TWG meeting.

**Updates to the List of Members**

[List of Members](#)

- UKHO - Colin Sheperd is added to the list of members.

**Review the Provisional NSHC TWG Website**

- SE mentioned the 'old' website ([www.nshc.pro](http://www.nshc.pro)) is no longer working.
- The website has been created by SE at <https://www.bshc.pro/working-groups/twg>, as part of the BSHC webpages.

**NSHC TWG Report to the 36<sup>th</sup> NSHC Conference (29-30 March 2023)**

- SE will prepare the report presentation and circulate beforehand in good time.
- The NSHC TWG Report to the 36<sup>th</sup> NSHC Conference will actually be a combination of the both NSHC TWG 24<sup>th</sup> and 25<sup>th</sup> meetings.

**Date & Venue of TWG26 6-7 February 2024**

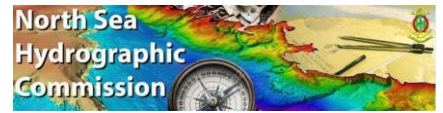
- To be held in Göteborg, Sweden at the SMA.

**Meeting Closed at 1200 CEST**

## ANNEX A

 TWG25 List of Participants  
VTC, 7 February 2023

Country	Organisation	Name	E-mail address
Belgium	MDK	Johan Verstraeten	<a href="mailto:iohan.verstraeten@mow.vlaanderen.be">iohan.verstraeten@mow.vlaanderen.be</a>
Denmark	GST	Nicki Riber Andreasen	<a href="mailto:nirib@gst.dk">nirib@gst.dk</a>
France	SHOM	Gwénaële Jan	<a href="mailto:gwenaele.jan@shom.fr">gwenaele.jan@shom.fr</a>
France	SHOM	Gael Andre	<a href="mailto:gael.andre@shom.fr">gael.andre@shom.fr</a>
Germany	BSH	Andreas Boesch	<a href="mailto:andreas.boesch@bsh.de">andreas.boesch@bsh.de</a>
Iceland	IHG	Andri Leifsson	<a href="mailto:andril@lhg.is">andril@lhg.is</a>
Netherlands	MINDEF	Ronald Kuilman	<a href="mailto:rb.kuilman@mindef.nl">rb.kuilman@mindef.nl</a>
Sweden <sup>1</sup>	SMA	Thomas Hammarklint	<a href="mailto:thomas.hammarklint@sjofartsverket.se">thomas.hammarklint@sjofartsverket.se</a>
United Kingdom	UKHO	Colin Sheperd	<a href="mailto:colin.shepherd@ukho.gov.uk">colin.shepherd@ukho.gov.uk</a>
<sup>1</sup> Chair of the Tidal Working Group			



**ANNEX B**

**Program NSHC TWG25**

**7 February 2023**

VTC

	<b>Tuesday 07 February 2023</b>
<b>Morning</b>	<b>09:00 Tidal WG Meeting commence</b>  <b>10:25 Break</b>  <b>10:40 Tidal WG Meeting continue</b>  <b>Tidal WG Meeting closed at the latest 12:00</b>

## ANNEX C

**Agenda**  
**NSHC TWG25 Meeting**  
**7 February 2023**  
VTC

**Tuesday 07 February 2023**

09:00 - 09:30	<p>Opening, welcoming notes</p> <p>Introduction round</p> <p>Appoint a secretary for the meeting</p> <p>Review the <a href="#">List of Participants</a></p> <p>Review the <a href="#">Program</a></p> <p>Adoption of the <a href="#">Agenda</a></p>	<p>Chair</p> <p>All</p>
09:30 - 10:25	<p>Review the work of the TWG and actions since TWG24</p> <p>Adoption of the <a href="#">Minutes and Work Plan</a> from the TWG24 Meeting [<a href="#">Photo</a>]</p> <p>Review the <a href="#">List of Actions</a> from the <a href="#">34<sup>th</sup> NSHC Conference</a> [<a href="#">Photo</a>]</p> <p>Review the <a href="#">Minutes</a> and <a href="#">List of Actions</a> from the <a href="#">35<sup>th</sup> NSHC Conference</a> [<a href="#">Photo</a>]</p> <p>Review the <a href="#">Program</a> and <a href="#">Draft Agenda</a> from the <a href="#">36<sup>th</sup> NSHC Conference</a></p> <p>Propose amendments to the <a href="#">Terms of Reference</a></p> <p>Open discussion</p>	<p>All</p>
10:25 - 10:40	Coffee break	

10:40 - 11:30	<p>Presentations and discussions</p> <p><a href="#">NSHC TWG AP 24/03: Refinement TVU norm</a></p> <p><a href="#">Update on NSHC TWG AP 23/02: Investigate the differences at all MS borders (and overlapping parts of surfaces) between national LAT reference surfaces</a></p> <p><a href="#">Approximate LAT at the Port of Rotterdam</a></p> <p><a href="#">Update of the Belgian LAT-surface</a></p>	<p>All</p> <p>Ronald, NL</p> <p>Ronald, NL</p> <p>Ronald, NL</p> <p>Johan, BE</p>
11:30 - 12:00	<p>Any other business</p> <p>Proposal of a permanent TWG Chair (<a href="#">NSHC35 Action</a>)</p> <p>Update the <a href="#">List of Members</a></p> <p>Review the provisional <a href="#">TWG Website</a></p> <p>Review the <a href="#">Work Plan</a> and unresolved issues of this meeting</p> <p><a href="#">TWG Report</a> to the <a href="#">36th NSHC Conference</a>, 29-30 March 2023 and list of matters to be reported (<a href="#">TWG Presentation</a>)</p> <p>Proposals for the venue and dates of the next meeting (<a href="#">TWG26</a>) Chairman's proposal: TWG26, 6-7 February 2024 (Göteborg, Sweden)</p>	<p>All</p> <p>Chair</p>
12:00	Closing of the meeting	Chair



## ANNEX D

### NSHC Tidal Working Group Terms of Reference 27 September 2022

To be approved by the NSHC 36<sup>th</sup> 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 Tidal Working Group  
Work Plan and Actions  
7 February 2023**

To be approved by the NSHC 36<sup>th</sup> 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.		
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### 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	TWG26, Feb 2024	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 defined in S-44) can be allocated by the LAT models? Member states send their suggested values to NL	All	TWG25, Feb 2023  Closed and 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 <b>approximately</b> 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	TWG26, Feb 2024	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	Done	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	DK, DE, NL All	Done	WP 18/01

		send their suggested values to NL.			
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	Done	n/a
AP 25/01	Investigate LAT differences at overlapping parts of surfaces.	Each member state should supply LAT surfaces for an as large as possible area of the North Sea to NL who will compare the surfaces.	All	TWG26 Feb 2024	WP 18/01