Vth IHO TIDAL COMMITTEE MEETING

Lima, Perú, 23-25 April 2003
Final Report

1. OPENING

The meeting was opened at 0900 on 23rd April 2003 in the Balta Room at the Las Americas hotel. The list of participants is given in Annex A.

Captain Aquiles Carcovich, Acting Director of the Peruvian Hydrographic Office, welcomed the delegates attending the Vth Meeting of the IHO Tidal Committee and wished them a successful and fruitful meeting.

The Chairman of the Committee thanked Captain Carcovich for the excellent arrangements made by the Directorate of Hydrography and Navigation of Peru and congratulated him on the celebration of its 100th Anniversary. He thanked especially Commander Lazo and Lt Cdr Montoro.

Finally, Lt Cdr Steve Shipman, Professional Assistant Hydrography of IHB, thanked the Peruvian Navy Hydrographic Office for the excellent facilities arranged for holding the meeting and on behalf of the Directing Committee wished the delegates a successful meeting.

During the morning of April 23rd, a Tidal Seminar was held with presentations made by several delegates attending the meeting. In Annex B, a detailed list of the subjects presented is given.

2. ADMINISTRATIVE ARRANGEMENTS

2.1 Adoption of the agenda

The agenda was put before the delegates for consideration and approved without modification. See Annex C.

2.2 Conduct of the session, timetable and documentation

The timetable and other documents were presented to the delegates. The timetable can be seen at Annex D.

Apologies were received from New Zealand, Germany, Japan, and Norway, as well as Mr Dan Pillich, an invited observer.

2.3 Report on Intersessional Activities

The Chairman of the IHO TC informed the participants about the activities carried out from the IVth Meeting in Japan. He particularly mentioned the reports submitted to IHB for inclusion on the Annual Report and a detailed report submitted for consideration of the International Hydrographic Conference held at Monaco in May 2002. He referred also to some other subjects pending from the previous meeting in Japan which were included in the Agenda for revision during this meeting.

3. PROGRAMME MATTERS

3.1 Accuracy requirement for Tides and Sea Level prediction models

The TC discussed this matter widely and a summary of the main thoughts on vertical datums is presented at Annex E.

3.2 Feedback on Migration activities to LAT/HAT

The Committee discussed the necessity for continuous revision on migration activities to LAT/HAT as recommended previously, which led to the recommendation that the IHB distribute a Circular Letter to Member States asking for information on how this migration was being carried out and on the need to advise on this matter. Mr Charles O`Reilly (Canada) will cooperate with Lt Cdr Steve Shipman (IHB) in the preparation of this document.

3.3 XML format for Tidal Data

Mr Dan Pillich sent a written report on this matter stating that the marine XML consortium had not yet been established, so there were no activities to monitor.

Nevertheless, he advised that a European project aimed at developing marine XML is starting up under the auspices of the European Union. In this project, tides are part of the prototype of the development.

The Tidal Committee decided to follow closely the development of this project through the participation of Mr Dan Pillich (observer) and Mr Wayne Jones (Australia) who were asked to keep the Committee informed on advances of this matter through the IHB.

3.4 Adoption of a Standard Constituent List

The meeting was provided with a new Standard Constituent List prepared by Mr Bernard Simon (France**)** who made several additions to the revised list contained in the IVth Meeting report.

After a brief discussion, the TC decided to provide a definitive list to Member States as soon as possible and asked Cdr John Page (UK) to work with Mr Simon in the revision of this list.

Once revised, the list will be sent to Member States through the IHB.

3.5 New Format for the Exchange of Harmonic Constants

Cdr John Page (UK) introduced this issue in the previous meeting in Japan, where the TC decided to send a requirement to the attention of the ISO Technical Committee 211.

After a brief discussion, the TC asked the IHB representative to follow up this matter and to inform the Committee subsequently.

3.6 Development of a Global Vertical Reference Surface

The TC regretted the absence of the USA representative who was expected to provide the background on this matter, having in mind that this issue was submitted to the TC by the International Hydrographic Conference according to the US requirement.

In previous meetings the TC had discussed this matter and reached the conclusion that the adoption of the vertical reference surface was a key goal to be achieved in the future and that until now there had been technical difficulties preventing its implementation with the required degree of accuracy.

The TC acknowledged that choosing the most suitable ellipsoid for a global vertical reference surface was best addressed by the geodetic community because they have the technical expertise to make the most informed decisions.

The choice of ellipsoid would appear to rest between ITRS and WGS 84. But as future hydrographic surveying seems destined to rely on the use of GPS, then WGS84 would become the most logical choice of ellipsoid even though ITRS might be marginally more accurate.

However, because ITRS and WGS84 ellipsoids will inevitably diverge with respect to time, then probably by 2010 the issue of temporal continuity will need

to be addressed.

It was concluded that the TC needs to monitor development within the geodetic community in regard to this issue. The link would be provided by PAH at the IHB, especially as he will also be attending the EUREF meetings as an observer.

3.7 Tidal Stream Observation and Analysis

This matter was raised by Mr Wayne Jones (Australia) who wanted to discuss briefly the common practices in some other countries.

He mentioned different problems in his country related to the observations and analysis of tidal stream data. Several delegates made contributions on this matter.

3.8 Relationship with IOC/GLOSS Program

It is the initiative of the Directing Committee of the IHO to establish a collaborative relation with the IOC/GLOSS Program, which is devoted to sea level observation to monitor its changes associated with decadal and inter-decadal variations due to phenomena such as global change and El Niño, for example.

Mr Patrick Caldwell, the invited observer representing GLOSS, made an overview on the organization and technical aspects of this program to illustrate the matter to the meeting.

It was decided that the TC would maintain links with GLOSS in order to identify common matters of interest for the future work of the Committee. These links should be maintained by the Chairman in coordination with the IHB. The contact persons in the GLOSS program are Mr Thorkild Aarup, Technical Secretary, and Mr Philip Woodworth, Chairman.

The TC also noted that GLOSS will hold its next meeting in Paris in October 2003 and that IHB (Lt Cdr Steve Shipman) will participate as an observer, and it is hoped that a member of the TC will be able to present a paper.

3.9 European Sea Level Service latest news

Dr Palle Bo Nielsen (Denmark) gave a presentation on the advances in the organization of this Service. He pointed out that the coverage of tidegauge stations across Europe is very well covered only for some areas.

He also informed the Committee about several matters requiring attention within the Services such as the need for homogenous sampling and quality of the data and harmonized policies on data management within different countries. A copy of his presentation is attached to this report at Annex F.

3.10 Tides in ECDIS

The Committee re-emphasized its opinion that tides need to be a mandatory requirement in an ECDIS.

It was considered that ECDIS manufacturers should be encouraged to utilize official Hydrographic Office tidal prediction software which had been written to S-57 specifications.

One such product is currently available from the UKHO, but ECDIS manufacturers must be allowed the freedom to make their own choice of preferred tidal prediction software.

The TC also believes that it would be more beneficial if ENCs were capable of displaying dynamic soundings, with the tidal reduction being provided by the ECDIS tidal prediction package. Furthermore, the tidal reduction elements should be developed such that in an ideal situation real-time tidal data could be used to provide the tidal reduction when this facility becomes widely available.

4. RESIGNATION AND ELECTION OF NEW CHAIRPERSON

The current Chairman, Commander Alejandro Cabezas (Chile), who had been in this position for five years, put his resignation before the Committee for the consideration and election of a new Chairperson.

After a brief exchange of opinions on this matter and on the procedure to be followed for the election of the new chairman, Commander John Page (UK) volunteered to take up this position. The TC then asked the IHB representative to put forward his designation for consideration by Member States according to the normal procedures of the IHO.

5. DATES AND VENUE OF VIth MEETING

Taking into consideration the need for increased participation by Member States, which have shown problems attending the regular meeting of the TC, it was agreed that the Chairman would explore the possibility of holding the next meeting in Portugal, making contact with the proper authorities in that country.

Alternatively, it would be considered holding the next meeting in Australia, Russia or India in that same priority order.

The VIth meeting will be held in October 2004.

6. OTHER MATTERS

6.1 TC membership renewal

This issue was raised having considered that the composition of the Committee was established in 1987 and from that time only few countries have joined the Committee. The TC asked the IHB representative to circulate among Member States a document asking for new members in order to increase their participation in the Committee.

6.2 Revision of TC/TOR

It was proposed to amend the TC Terms of Reference in order to update them. After a detailed revision and further discussion, the TC agreed to modify TOR as shown in Annex G.

6.3 Translation of the French Manual on Tides

The TC was informed about initiatives to translate the French manual on tides developed by SHOM, into English and Spanish.

Mr Bernard Simon (France), author of the book, presented a draft copy of the manual, which is in a final stage of development, to the meeting.

The English version is being developed under a contract between SHOM, the Institut océanographique (Monaco) and IHB. The Spanish version is under evaluation at SHOA (Chile).

6.4 Future Work

The TC identified several matters that will need attention in the future, for example:

a. To monitor, on a permanent basis, the activities under consideration by Member States to migrate to LAT/HAT, and to consider advising MS requiring technical support and to develop a strategy on this matter.
b. To continue observing the development of codification of tidal data in

XML language.

c. To adopt a definitive list of standard constituents.
d. To monitor the requirement sent to ISO technical committee 211 in regard of the new format for exchange of harmonic constants.
e. To monitor the development within the geodetic community of a global vertical reference surface.
f. To establish links with organizations related to tidal matters such as, for example, GLOSS, ESEAS, the Hydrographic Society and others.
g. To monitor the development of the inclusion of tides in ECDIS.
h. To monitor and encourage developments in Digital Tide Tables by MS.
i. To publish information regarding the TC issues on the IHO web site.

6.5 ADOPTION OF DRAFT REPORT

The draft report was adopted with modifications. A final version would be submitted by the Chairman to the TC Members at the earliest opportunity.

7. CLOSURE

The participants expressed their gratitude and appreciation for the dedication and professionalism of their Chairman, Commander Alejandro Cabezas, who had always conducted the proceedings with dignity and diligence, and wished him well in all his future endeavours.

The Vth meeting was then closed on 25th April 2003 at 1200.

ANNEX A

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ANNEX B

TIDAL SEMINAR

Global Vertical Reference Surface – The Australian situation
(Mr. Wayne Jones, Australian Hydrographic Office, Australia)

Tides in Greenland. A Comparison of Methods
(Mr. Palle Bo Nielsen, Royal Danish Administration of Navigation and Hydrography, Denmark)

Advances of the applications of ocean tides for hydrographic surveying over the past half century in China
(Mr. Zhai Goujun, Tianjin Instiute of Hydrographic Surveying and Charting, People's Republic of China)

Recent Tidal Activities in Canada
Part 1 Determination of World Largest Tide
Part 2 Real-time Water Level Forecasts
Part 3 Migration Strategy to LAT/HAT
(Mr. Charles O'Reilly , Canadian Hydrographic Service/Atlantic Region Bedford Institute of Oceanography, Canada)

A worldwide tidal prediction software
(Mr. Bernard Simon, Etablissement Principal du SHOM, France)

Latest Developments in the UHHO Tidal Prediction package "Totaltide"
(Commander John Page, Hydrographic Office, United Kingdom)

ANNEX C

PRELIMINARY AGENDA

1. OPENING
    a. Welcoming speeches

2. ADMINISTRATIVE ARRANGEMENTS
    a. Adoption of the Agenda
    b. Conduct of the Session, timetable and documentation
    c. Report on Intersessional activities

3. PROGRAMME MATTERS
    3.1 Recommendation on accuracy requirements for tide and sea level Prediction Models
    3.2 Feedback on migration activities to LAT/HAT
    3.3 XML format for Tidal Data
    3.4 Adoption of a Standard Constituents Lists
    3.5 New format for the exchange of harmonic constants
    3.6 Proposal for the development of a global vertical reference system
    3.7 Tidal Stream observations and analysis
    3.8 Relationships with IOC/GLOSS
    3.9 European Sea Level Service - latest news
    3.10 Tides in ECDIS

4. RESIGNATION AND ELECTION OF NEW CHAIRMAN

5. VENUE AND DATES OF THE VIth IHO/TC MEETING

6. OTHER MATTERS
    6.1 TC membership renewal
    6.2 Revision of TC/TOR
    6.3 Translation of the French Manual on Tides.
    6.4 Future work
    6.5 Adoption and publishing of meeting report

7. CLOSURE OF SESSION

ANNEX D

Vth. IHO TIDAL COMMITTEE MEETING

LIMA, PERU, 23-25 APRIL 2003

TIMETABLE

	APRIL 23	**APRIL 24**	**APRIL 25**
09.00 - 09:15	**1.- Opening**, Hotel Las Americas Welcoming speeches	**<u>Program Matters continues.</u>** 3.6 Development of a Global Vertical Reference Surface 3.7 Tidal Stream observations and analysis 3.8 Relationship with IOC/GLOSS Program.	**<u>Program Matters continues.</u>** **6.- Other matters** 6.1 TC membership renewal 6.2 Revision of TC/TOR 6.3 Translation of the French Manual on Tides. 6.4 Future work 6.5 Adoption and publishing of meeting report **7.- Closure**
09:15 - 11:00	TIDAL SEMINAR		
11:00 - 11:20	Tea/coffee break	Tea/coffee break	**Visit to DHN**
11:20 - 13.00	**TIDAL SEMINAR continues**	3.9 European Sea Level Service. Latest news 3.10 Tides in ECDIS	
13:00 - 13:15	Tidal Seminar ends. Break for official photo		
13:00 - 14:00	Lunch break	Lunch break	**Lunch break**

14:00 – 15:20	TC Meeting commences 2. -Administrative Arrangements Adoption of the agenda Conduct of the session Report of Intersessional activities **3.- Program Matters** 3.1 Recommendation on accuracy requirements for tide and sea level Prediction Models 3.2 Feedback on migration activities to LAT/HAT	Program Matters continues. As deemed necessary	
15:20 - 15:40	Tea/coffee break	Tea/coffee break	
15:40 - 17:30	**Program Matters continues.** 3.3 XML format for Tidal Data 3.4 Adoption of a Standard Constituent List 3.5 New format for the exchange of Harmonic Constants	Program Matters continues. **4.- Resignation and election of new Chairperson** **5.- Dates and venue of the Vith IHO/TC meeting**	
17:30	End of first day session	End of second day session	
20.00	Welcome reception at Hotel las Americas, Balta Room, offered by DHN.		

ANNEX E

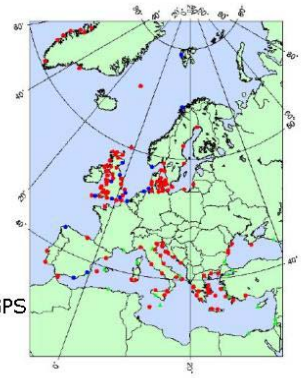
THOUGHTS ON VERTICAL DATUMS

- Vertical datum models differ from hydrodynamic models insofar as they are static surfaces reflecting the spatial aspect of high, mean and low water behavior.
- Temporal-spatial models or hydrodynamic models can be extremely useful, but are not necessarily mandatory, in building vertical datum models.
- There is a difference between modeling a datum "target" (e.g. LAT, HAT) and modeling an official datum, which attempts to approximate this target. In many instances, there is inherent "noise" in the original assignment of local datums. This "noise" is additive to the errors derived from modeling the spatial nature of the harmonic tide. Significant man-made differences may exist even in areas of very uniform tidal range. These differences exacerbate the problems that hydrodynamic models face in agreeing with reality.
- Official vertical datum models derived through spirit leveling and high precision GPS should easily reflect the datums at tidal stations very exactly.
- Datum models should interpolate information between tidal stations within the historically accepted accuracies required by hydrographic authorities. These accuracies are already well known and understood.
- Maximum inaccuracies occur between tide stations, and if unacceptable, usually lead to the creation of a new station. Over time, this fact greatly determines the density of available tidal sites.
- At best, datum targets have an ambiguity of one decimeter, and can exceed several decimeters.
- However, once an official tidal datum is determined in reality, it is now recoverable to within centimeters by spirit leveling or GPS. In other words, it is no longer ambiguous. This will be by definition true at the controlling tidal stations and, using high precision GPS, can be also become true between stations. Of course, the ambiguity of the target surface will still exist.
- Tidal temporal-spatial models will need to be given the transformation required to go from their geodetic or equilibrium reference to the official hydrographic datum.
- Datum or transformation models should be given very precise names (including the tidal epoch) so as to eliminate any confusion as to their identity.
- Hydrographic offices have traditionally not developed the methodology to change vertical datums. Adjustments usually occur on a site by site and chart by chart basis. It may often not be readily apparent that a new datum has been adopted as, generally speaking, no accepted datum naming convention exists.

ANNEX F

European Sea Level Service (ESEAS)

22 participating countries
4 countries in communication



● Tide gauge
◆ Tide gauge + CGPS
▲ MedGLOSS sites

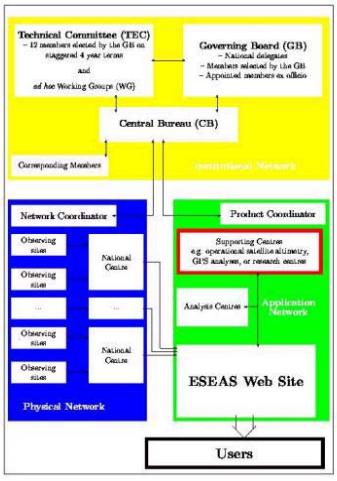
European Sea Level Service

ESEAS (www.eseas.org)

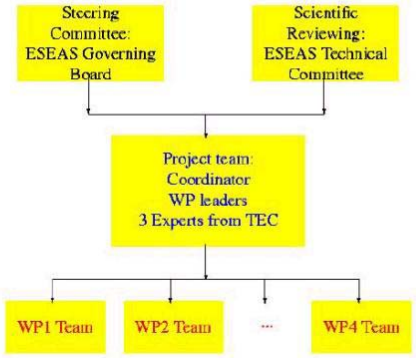
We have
- 10 000 (station) years of tide gauge observations
-> 50 operators and data archives
- heterogeneous sampling and quality
- different data policies

We need
- an European inventory
- easy access to data
- common standards for QA
- knowledge on vertical land movements at tide gauges

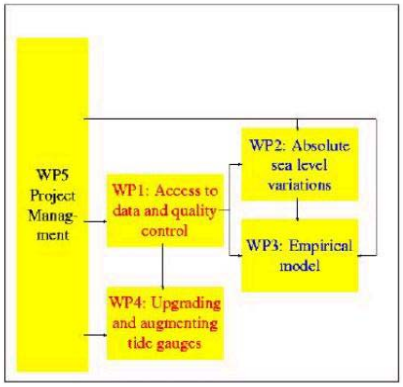
ESEAS



ESEAS - Research Infrastructure



ESEAS - Research Infrastructure



ESEAS - Research Infrastructure

Technological objective

- to support the ESEAS research infrastructure
- to facilitate
  - transnational coordination
  - upgrading of the network of observing sites
  - standardisation of the network
  - operational routines
  - databases
  - quality-control

Scientific objective

- to study sea level variations at inter-annual to century time scales
- to quantify potential future changes in mean sea level.

Major applications of tide gauge data

A: Absolute sea level changes

Requirements: co-location with GPS, long-term, open ocean

B: Ocean circulation

Requirements: pairs across straits

C: Calibration of satellite altimetry

Requirements: close to satellite tracks, co-location with GPS

D: Storm surge warning

Requirements: near real time

ESEAS - Research Infrastructure

5 Work Packages

WP1 - Quality Control

Quality control of the hourly tide gauge data

Web-based interface to national observations

Classification of tide gauges (abs. sea level changes, ocean circulation, long-term, calibration of satellite altimetry, storm surge warning)

Data archaeology

WP2 - Absolute sea level variations

Determination of vertical land movements at tide gauges in order to decontaminate the relative sea level records for this bias

use of continuous GPS

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ESEAS - Research Infrastructure

5 Work Packages - cont.

WP3 - Decadal to inter-decadal sea level variations

Determination of sea level variations on inter-decadal time scales in the North Atlantic and the semi-enclosed European seas

Assessment of secular relative sea level trends for the European coasts

Research intensitive

Use of WP1 and WP2 results plus PSMSL

Combine tide gauge data and satellite altimetry to propagate high spatial sea level variations to longer time scales

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ESEAS - Research Infrastructure

5 Work Packages - cont.

WP4 - Improving the sea level observing system

Improvement of the network of ESEAS Observing Sites through upgrading of selected tide gauges and co-location of gauges with continuous GPS

WP5 - Project Management

ANNEX G

IHO Tidal Committee – Proposed Amended Terms of Reference

Membership:

Membership of the IHO Tidal Committee is open to all Member States wishing to participate. Representatives are nominated by IHO Member States. The Committee may invite observers as ex officio members to participate in its deliberations during and between meetings. Observers are not entitled to vote.

Organization:

The business of the Committee will be conducted by a Chairperson or a Vice-Chairperson. The Committee will conduct its business mainly by correspondence. Meetings will usually be held at intervals of about 18 months. ~~The functioning of the Committee will be regulated by an internal document, the "Terms of Procedure~~.

Objectives:

1. To make recommendations concerning any tidal and related matters requiring discussion, development and coordination within the IHO.

2. To cooperate with other IHO bodies where tidal matters are concerned.

3.To advise on questions related to vertical datums.

~~4. To advise on issues related to the IHO Tidal Constituents Data Bank.~~

4. To advise on issues concerning the exchange and distribution of tidal and related data.

5. To advise on questions related to tidal observations, analysis and predictions.

Procedure:

~~**Draft Terms of Procedure**~~

1. The Chairperson is to submit a report each year for inclusion in the IHO Annual Report

2. The Chairperson is to submit a report prior to each ordinary International Hydrographic Conference covering the Committee's affairs since the previous Conference.

3. Should the Chairperson be unable to exercise his/her function a Vice-Chairperson will take over.

4. The Committee should strive to decide by consensus. If a vote is required, the quorum required is 5 delegates, the majority required for acceptance is to be an absolute majority.

5. The Chairperson is proposed by ~~the delegates of~~ the Tidal Committee members and confirmed by MS according to the standard IHO procedure. The Vice-Chairperson is elected by the Committee~~, and would be the delegate from the country hosting the meeting~~.

6. The Chairperson is elected for a three-year period and can be re-elected for one additional three-year period.