

GLOBAL VERTICAL REFERENCE FRAME

- References:
1. CL 60/1994
 2. CL 26/1995
 3. CL 42/1995
 4. IHO-Publication M-4, Specification 405
 5. CL 30/1996
 6. CL 1/1997
 7. CL 25/1997
 8. CL 41/2001

Dear Sir,

Under cover of CL 41/2001 the Bureau informed Member States of recent developments related to the development and definition of a global vertical reference surface and invited them to send their comments to the Bureau.

The Bureau is grateful to the 13 Member States who responded. A summary of the comments provided can be found at Annex A.

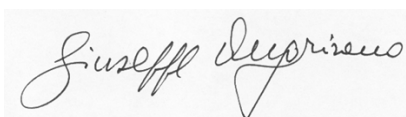
It seems that certain commonalities, which might be considered a “preliminary IHO standpoint”, can be deduced from the responses:

1. A preference for a global vertical reference surface, which is time invariant and stable; preferably the WGS84 ellipsoid.
2. The inadequate accuracy of present geoid models, particularly in sea areas, and the need for improvement.
3. The implementation challenges as the relationship between the global reference surface, geoid and chart datum has to be determined.

The IHB will attend meetings of relevant IAG Commissions (e.g. the annual EUREF meeting in June this year) and will inform Member States of any developments concerning this issue.

Member States are kindly requested to inform the IHB of national or regional developments in this field so that this information can be disseminated to all IHO Member States.

On behalf of the Directing Committee
Yours sincerely,



Rear Admiral Giuseppe ANGRISANO
President

MEMBER STATES' RESPONSES TO CL 41/2001

Australia

Supports the concept of a global vertical reference frame as this would facilitate numerous hydrography related activities. The selected reference surface should be time independent and stable, continuous, and should allow for rigorous and unambiguous calculations. It would be advantageous if the selected reference frame were compatible with the horizontal reference frame and could be realized without the need for unique equipment during data collection (survey) and use (navigation). "Natural" surfaces (e.g. MSL, LAT) are time variant and do not allow for rigorous calculations. The surface that fits best the requirements is the WGS84 ellipsoid; keeping in mind that the vertical resolution of GPS should improve after 2005. Selection of this ellipsoid would be advantageous at the data collection and management stages and would allow to transfer data to any reference surface required by the user.

Canada

Considers the subject of a global vertical reference frame to be extremely important for all HOs. Other HOs and Canadian experts were consulted when preparing the response to the CL. Agrees that discussions within the IHO should be restarted and that a consolidated IHO standpoint should be developed by charging the IHO Tidal Committee to develop recommendations for the latter.

Believes that the following approach allows for future development and improvement:

- The WGS84 ellipsoid should be used as fundamental datum for all hydrographic activities. Vertical measurements to be related to that ellipsoid so that they can be adjusted in case the ellipsoid will be redefined.
- Whenever possible, differences between the WGS84 ellipsoid and the local geoid should be recorded
- Differences between the ellipsoid and chart datum should be recorded and used in the construction of chart databases. Supports Proposal No. 12 (XVIth IHC) submitted by the USA.

Estonia

Strongly supports the idea of a global vertical reference system and the development of a consolidated IHO standpoint. Such a system is very important for hydrographic surveys and electronic charts allowing to link data of neighbouring countries.

France

No specific comments.

Greece

In favour of adopting a unified global vertical reference system. Discussions within IHO have probably to be resumed to develop a consolidated IHO standpoint.

The Netherlands

The points mentioned in the CL are known and subscribed to. A global vertical reference frame has still to be found and is not an urgent "must" for most practical purposes. During the 24th NSHC Conference, The Netherlands tabled a paper explaining the need for a unified equipotential surface and the relation between ellipsoid and mean sea level (MSL) and proposed to develop a common MSL model for the

North Sea. The Sub-Commission Marine Geodesy (of the Netherlands Commission on Geodesy) had already decided to start the North Sea Geoid Project.

New Zealand

Supports the principal results of discussions set out in the CL and the proposal to develop a consolidated IHO standpoint. Currently working on a new datum for New Zealand; once results are available they will be forwarded to the IHO for information.

Norway

Global vertical reference frame will be important for many applications. Once established, HOs will have to relate observations and products to this reference. Issues raised in the CL require geodetic competence and may need some time to mature within the HOs. The IHO should be represented in the relevant IAG forums to look after IHO interests and to obtain and compile information for distribution to IHO MS. Although the IAG is the relevant international body to recommend a suitable reference frame, an IHO WG may be required to develop recommendations for the IHO.

Portugal

Considers that the adoption of a global vertical reference frame based on WGS84 is very important. However, the present accuracy of geoid models is insufficient. Determines already now the vertical offset between WGS84 and the local Chart Datum in small areas surveyed with GPS RTK/OTF systems to develop a refined WGS84 geoid model in cooperation with the Geographic Institute of Portugal.

Russian Federation

As indicated in responses to previous CLs, the adoption of LAT as global chart datum is considered inappropriate because of its spatial changeability and, particularly, in areas where the tidal range is small (< 0.5 m). The possible adoption of a global vertical reference system by the next IUGG Assembly is of particular interest.

Spain

Thinks that discussions should be restarted. If such a global vertical reference frame is adopted, a certain time for adaptation to the new system will be required.

Turkey

A global vertical reference frame is considered useful to integrate data from various sources. It seems that results of altimetric satellite projects will allow to determine a suitable reference frame. As stated in the CL, several scientific disciplines are involved in developing such a frame and adequate cooperation between these disciplines is necessary.

UK

The subject of the CL has also been circulated as Conference Proposal No. 12 for the upcoming IHC. Supports the principle of a single global vertical reference frame, preferably WGS84, for all heights and depths, but is concerned that the implementation will create significant challenges as the relationship between geoid and Chart Datum is not globally known and as the accuracy of current geoid models is insufficient.
