

**NOTE:** Suggested changes by Netherlands in **RED**  
 Suggested changes by Germany in **BLUE**  
 Suggested changes by South Africa in **GREEN**  
 Suggested changes by France in **ORANGE**  
 Suggested changes by Peru in **MAROON**  
 Suggested changes by the United States in **PURPLE**

### Resolutions of the IHO – Repertory of Resolutions (M-3)

The resolutions of relevance to TWCWG are as follows:

#### **Section 2.3.1 Charts – General:**

- Naming Convention for the Vertical Datum of Charts - Resolution 1/2008 (formerly A2.16):

#### **Section 2.2 Tides and Water Levels;**

- Datums and Bench Marks – Resolution 3/1919 as amended (formerly A2.5);
- Use of terms “Tide”, “Tidal Stream”, and “Current” - Resolution 4/1919 as amended (formerly A2.8);
- Description of Currents and Tidal Streams - Resolution 5/1919 as amended (formerly A2.9);
- Exchange of Tidal Information - Resolution 9/1919 as amended (formerly A6.1);
- Advance Supply of Tidal Predictions - Resolution 10/1919 as amended (formerly A6.2);
- Issuing Authorities for Tidal Predictions - Resolution 2/1947 as amended (formerly A6.3);
- Extension of World Network of Tidal Observations - Resolution 5/1932 as amended (formerly A6.4);
- Study of Mean Sea Level - Resolution 6/1932 as amended (formerly A6.5);
- Geographical Position of Stations - Resolution 1/1967 (formerly A6.6);
- Collection and Publication of Tidal Data - Resolution 1/1977 as amended (formerly A6.7);
- National Tidal Constituent Banks - Resolution 2/1977 as amended (formerly A6.8); and
- Release of Tidal Data to Commercial Organizations - Resolution 1/1994 as amended (formerly A6.9);

#### **Section 2.4.7 – Publications – Tide Tables.**

- Mean Sea Level Symbols - Resolution 7/1937 as amended (formerly G1.1);
- Time to be used - Resolution 27/1919 (formerly G1.2);
- Translation of Headings etc. - Resolution 7/1926 as amended (formerly G2.1);
- Information to be given in Tide Tables - Resolution 28/1919 as amended (formerly G3.1);
- Mean Sea Level - Resolution 29/1919 as amended (formerly G3.2); and
- Mention of Origin of Tidal Predictions - Resolution 6/1947 (formerly G3.3);

The relevant pages from M-3 2<sup>nd</sup> Edition are attached below.

All these resolutions have been reviewed by the TWLWG over recent years.

<b>NAMING CONVENTION FOR THE VERTICAL DATUM OF CHARTS</b>	<b>1/2008</b>		<b>A2.16</b>
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1 It is resolved that the vertical datum used on navigational charts, Chart Datum (CD), be defined without ambiguity in order to enable subsequent bathymetric data comparisons to be conducted in an efficient and reliable manner and for the accurate combination of datasets using different vertical datums.

2 It is recommended that a designated epoch for example CD (2006) or LAT-UK (2000) be used. The decision as to when a change in CD for a given area is necessary and the name given to that specific definition of CD remains a matter for each Member State based on their national requirements.

**SECTION 2.2 – TIDES AND WATER LEVELS**

- A2.5 [Datums and benchmarks](#)
- A2.8 [Use of terms "Tide", "Tidal Stream" and "Tidal Current"](#)
- A2.9 [Description of currents and tidal streams](#)
- A6.1 [Exchange of tidal information](#)
- A6.2 [Advance supply of tidal predictions](#)
- A6.3 [Issuing authorities for tidal predictions](#)
- A6.4 [Extension of world network of tidal observations](#)
- A6.5 [Study of mean sea level](#)
- A6.6 [Geographical positions of tide stations](#)
- A6.7 [Collection and publication of tidal data](#)
- A6.8 [National Tidal Constituent Banks](#)
- A6.9 [Release of Tidal Data to Commercial Organizations](#)
- A6.10 Metadata for Tide records
- A6.11 Metadata for Tidal Stream/ Current records

TITLE	Reference	Last amendment (CL or IHC)	1 <sup>st</sup> Edition Reference
<b>DATUMS AND BENCH MARKS</b>	<b>3/1919 as amended</b>	<b>10/2017</b>	<b>A2.5</b>

1 It is resolved that the datum of tide/water level observations and predictions for mariners shall be the same as chart datum (datum for sounding reduction).

2 It is resolved that chart datum and other tidal/water level datums used should be clearly stated on charts and all other navigational products.

3 It is resolved that chart datums (datums for sounding reduction), the datums of tide/water level prediction and other tidal/water level datums shall always be connected with the general land survey datum, and, in addition, with a prominent and permanent fixed mark in the neighbourhood of the tide gauge, station, observatory etc.

4 It is resolved that ellipsoidal height determinations of the vertical reference marks used for tidal/water level observations should be made, in order to support the production of seamless data sets; i.e. to allow the translation between data sets with differing vertical datums. It is further resolved that such observations should relate to a geocentric reference system, preferably the International Terrestrial Reference System (ITRS), the World Geodetic System 1984 (WGS 84) or other geodetic reference systems coincident with ITRS.

#### In oceanic tidal areas

5 It is resolved that heights on shore, including elevations of lights, should be referred to a Highest Water (HW) datum.

6 It is resolved that the Lowest Astronomical Tide (LAT\*), or a datum as closely equivalent to this level as is practical and acceptable to Hydrographic Offices, be adopted as chart datum. Alternatively, another, similar datum may be used if low water levels in a specific area frequently deviate from LAT, or a different datum has been established by national policy.

7 It is resolved that Highest Astronomical Tide (HAT\*), or a datum as closely equivalent to this level as is practical and acceptable to Hydrographic Offices, be adopted as the datum for vertical clearances. Alternatively, another, similar datum may be used if high water levels in a specific area frequently deviate from HAT, or a different datum has been established by national policy.

8 It is recommended that LAT and HAT be calculated either over a minimum period of 19 years using harmonic constants derived from a minimum of one year's observations or by other proven methods known to give reliable results. Tide levels should, if possible, reflect the estimated uncertainty values obtained during the determination of these levels.

#### ***In mixed waters (where water level variability is due to both tidal and regionally specific forcing mechanisms) and inland waters***

9 It is resolved that depths, and all other navigational information should be referred to an appropriate level that is practical and acceptable to Hydrographic Offices (such as lowest water (LW) as a reference level for depths and HW for vertical clearances). The selection of which one of the alternatives to be used

is a difficult issue which can only be determined locally and which will be largely dependent on seasonal hydrological conditions. LW and HW are defined preferably as the mean of lowest/highest water levels, or as a suitable percentile of lowest/highest water levels, observed over a long time period from a minimum of one year's observations of free water level.

***In geographical areas where the tidal range is negligible (for example less than 0.30m) and in non-tidal areas***

10 It is resolved that depths, and all other navigational information should be referred to Mean Sea Level (MSL) or other level as closely equivalent to this as is practical and acceptable to Hydrographic Offices.

*Note: The adopted level may be a well-defined geodetic datum as used for heights in land survey applications or an observed local Mean Sea Level (MSL) based on long series of water level observations.*

11 In order to support other non-navigational applications and also to indicate the characteristics in the area, it is recommended to adopt the mean of yearly lowest/highest water levels, or a suitable percentile of lowest/highest water levels, observed over a long time period from a minimum of one year's observations.

*\* Note: LAT (HAT) is defined as the lowest (highest) tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions.*

<b>USE OF TERMS "TIDE", "TIDAL STREAM" AND "TIDAL CURRENT"</b>	<b>4/1919 as amended</b>	<b>18/1955</b>	<b>A2.8</b>
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It is resolved that the term "tide" or its equivalent in another language shall be used for designating the periodical vertical movement of the **large bodies of water**, and the terms "tidal stream", "tidal current", or their equivalents for designating the periodical horizontal movement of the **large bodies of water**.

<b>DESCRIPTION OF CURRENTS AND TIDAL STREAMS</b>	<b>5/1919 as amended</b>	<b>19/2008</b>	<b>A2.9</b>
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1 Tidal stream: The alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. Also called tidal current. (IHO dictionary).

2 Current: Water or other fluid in essentially horizontal motion. In British terminology, a non-periodical movement of water, generally horizontally, due to many causes such as different temperatures and prevalent winds. Some may be temporary, others permanent. (IHO dictionary).

1 (3) It is resolved that a current shall be described by the direction towards which it is running.

2 (4) It is resolved that tidal streams shall be defined by the direction towards which they flow.

a) If desired, the terms "flood stream" and "ebb stream" may be used for designating the horizontal movement of the water when the tide is respectively rising or falling, but to avoid

any ambiguity, in the case of streams which do not turn at about the time of local high or low water, an indication shall be given of the direction towards which the stream flows.

3 (5) It is resolved that information relating to tidal streams shall be referred to the time of high or low water at a port for which tidal predictions are given in the Tide Tables.

4 (6) It is strongly recommended that the port selected for reference be preferably a port for which daily predictions are given in Tide Tables (standard ports) and where the tides have similar characteristics to those of the currents under consideration.

5 (7) The rules of the above paragraphs 3 and 4 would not be applicable for those countries which publish Current Tables giving daily information relating to tidal streams with reference to the hours of the day. In such instances, it is recommended that the reference be made to the time of slack or maximum current at a place for which daily tidal stream predictions are given in such Tables.

6 (8) It is resolved that velocities shall be given in knots to 1 decimal place.

9 It is resolved that directions shall be given in arc-degrees.

7 (10) It is recommended that the effect of prevailing winds or long-continued weather conditions on local currents be recorded in Sailing Directions.

<b>EXCHANGE OF TIDAL INFORMATION</b>	<b>9/1919 as amended</b>	<b>42/2000</b>	<b>A6.1</b>
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It is resolved that published tidal information shall be freely exchanged between Member and Associate Member States. The exchange of tide and tidal current observations and predictions, as well as information related to places with vertical references measured after a nodal cycle, shall be made, as far as possible, in a form directly usable in electronic computers operating systems, and according to standards approved by all Member States

<b>ADVANCE SUPPLY OF TIDAL PREDICTIONS</b>	<b>10/1919 as amended</b>	<b>75/2006</b>	<b>A6.2</b>
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1 It is resolved that advance copies of tidal predictions shall be supplied, on request, to those Member States who require them for inclusion in their own published tables.

2 It is strongly recommended that these advance copies be supplied in sufficient time to be in the hands of the publishing authority not later than twelve months before 1 January of the year of predictions.

3 It is recommended that when tidal constituents or values of harmonic constants are changed from those used for tidal predictions for the previous year, the tidal constituents should also be supplied to the producer nation upon request together with the national tidal predictions.

4 It is recommended that tidal predictions supplied to other countries be in the form of the times and heights of high and low waters, unless these values are not normally predicted or are requested in another form.

<b>ISSUING AUTHORITIES FOR TIDAL PREDICTIONS</b>	<b>2/1947 as amended</b>	<b>IHC 10</b>	<b>A6.3</b>
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In the general interests of navigation it is resolved that tidal predictions to be used for any important commercial port or approach areas within a country's territorial waters shall be those established by the appropriate authority in which the port or the approach area is situated or is being maintained. It may be necessary to establish the authority for predictions if such predictions are made on a regional co-operative basis where several narrow stretches of water separate States. In this connection, it is strongly recommended that Member States extend their tidal observations to those areas, and prepare and publish their predictions **under the coordination of the authority established.**

<b>EXTENSION OF WORLD NETWORK OF TIDAL OBSERVATIONS</b>	<b>5/1932 as amended</b>	<b>19/2008</b>	<b>A6.4</b>
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1 It is recommended that the world network of tide stations be extended, that some well-distributed stations operate continuously, and that special efforts be directed towards the establishment of stations on the outer sea coast of the continents and oceanic islands.

2 It is recommended that governments which do not possess departments organized for this purpose be advised by the ~~IHB~~ **IHO** as to the desirability and means of undertaking the installation of tide gauges, the analysis of the resulting records and the preparation of Tide Tables. This work, carried out for selected stations, is of importance both in the interests of navigation and of science. It is possible that such work might be financed by commercial corporations or by other institutions if they were brought to appreciate its utility.

**3 It is recommended that tide stations be combined with GNSS receivers. It is noted that GNSS information can be used to measure the vertical crustal motion of the Earth with respect to the center of the Earth, This makes making it a useful technique to distinguish relative sea level rise from absolute sea level rise.**

**3 (4)** Concerning the extension of the world network of tidal stations with a view to improving co-tidal line charts, it is recommended that Hydrographic Offices give increased attention to the need for additional observations of tides and tidal streams in many areas not now adequately examined. It is noted that in certain regions observations extending over 29 days of tides and tidal streams are sufficient.

<b>STUDY OF MEAN SEA LEVEL</b>	<b>6/1932 as amended</b>	<b>20/2012</b>	<b>A6.5</b>
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1 It is recommended that the ~~IHB~~ **IHO** encourage Member States to carry out systematic, long-term tidal observations, records of typically 40 years or longer, in view of the importance of monthly and secular variations of mean sea level in connection with tidal prediction **and climate change studies.**

2 It is recommended that Member States make such data available for publication ~~by~~ **to** the Permanent Service for Mean Sea Level of the International Council of Scientific Unions, since that service publishes regular monthly and annual values of mean sea level for tidal stations throughout the world.

**3 It is recommended that Member States pursue long term sea level data ~~archaeology~~ to improve the quality, quantity and availability of long-term sea level data series. Recovering long-term historical sea**

level data is important for climate studies, oceanography, geodesy, geophysics, geology and a number of other disciplines.

<b>GEOGRAPHICAL POSITIONS OF TIDE STATIONS</b>	<b>1/1967</b>		<b>A6.6</b>
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It is recommended that when giving tidal information about stations whose identification on the chart is not obvious, the approximate geographical positions, or **GPS/GNSS coordinates**, of such stations be indicated.

<b>COLLECTION AND PUBLICATION OF TIDAL DATA</b>	<b>1/1977 as amended</b>	<b>42/2000</b>	<b>A6.7</b>
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1 It is recommended that Member States gather tidal data from as many locations as feasible and maintain sets of harmonic constants in National Tidal Constituent Data Banks.

2 It is recommended that Member States make public, using their website or other suitable means, tidal and tidal stream predictions and a list of locations included in their own Tidal Constituent Data Banks.

<b>NATIONAL TIDAL CONSTITUENT BANKS</b>	<b>2/1977 as amended</b>	<b>42/2000</b>	<b>A6.8</b>
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It is resolved that the National Tidal Constituent Banks should store the following information for each location:

- a) Location identification by number, name, country, body of water, and geographic or **GPS/GNSS** coordinates;
- b) Source, date, time zone, and duration of data used in analysis;
- c) Identification of geodetic levelling datum, and date of reference to this datum, elevation of mean sea level and, where applicable, the connection to and identification of the appropriate bench mark(s); and
- d) Listing of values for tidal constituents giving amplitudes in metres and Greenwich phase lags in degrees and designation of organization responsible for analysis. (Tidal constituents used should form part of those in the Standard List prepared by the ~~TWLWG~~ **TWCWG** and published on the IHO website.)

See also [9/1919 \(A 6.1\)](#) and [10/1919 \(A 6.2\)](#).

<b>RELEASE OF TIDAL DATA TO COMMERCIAL ORGANIZATIONS</b>	<b>1/1994 as amended</b>	<b>22/2001</b>	<b>A6.9</b>
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1 Recommendations for a Strategy concerning the Release of Tidal Data to Commercial Organizations

a) Definition of a Commercial Organization

A "commercial organization" is an organization which sells or distributes products. This definition does not refer to national authorities when they sell or distribute products in the context of their duties as a public service.

b) Definition of Tidal Data

The term "tidal data" for this document includes any data leading to and including tidal and tidal stream predictions.

c) General considerations

- i) In the interest of safe navigation, effective oil and hazardous material spill response, efficient search and rescue, and improved environmental management, the following statements are intended as a framework for Hydrographic Offices to make arrangements with commercial organizations.
- ii) As the development of quality-assured tidal predictions is a complicated matter, comprehensive knowledge and experience of tidal theory and practice are absolute prerequisites.
- iii) Computer technology can provide valuable support in presenting tidal predictions to users in convenient forms. However, the methods to present such information must be applied in an appropriate manner or data quality may suffer. Some Hydrographic Offices may find it unnecessary to develop all the products which are desired by all users; some development may be left to commercial organizations.

d) Recommendations

- i) The Hydrographic Offices should NOT be responsible for the correctness of any predictions developed and distributed by commercial organizations.
- ii) Official tidal predictions should be released by Hydrographic Offices only. Hydrographic Offices may, however, authorize recognized institutions to calculate and/or distribute these official predictions. Hydrographic Offices or these institutions authorized by them may release their own harmonic constituents, but not those of other Member States, as may be deemed appropriate.
- iii) Any product of a commercial organization should only be supplementary to obligatory official information required in terms of international conventions.
- iv) Authorized tidal differences or harmonic constituents should be supplied by the Hydrographic Offices for secondary stations.
- v) In addition to the products outlined above, Hydrographic Offices should have the right to produce, market and distribute any tide related products.
- vi) Where applicable, commercial organizations should be allowed to distribute official tide related products with the permission of the producing Hydrographic Office.

- 2 Recommendations for Standards to be applied in connection with the Release of Tidal Data
- a) Predictions used for primary stations should only be those provided by the Hydrographic Offices, unless a specific agreement is made between an HO and some other body.
  - b) For secondary stations, predictions based either on tidal differences or on harmonic constituents may be published, in all cases including the method, source, date of analysis and the relevant primary station. This applies to numerical as well as graphical representation.
  - c) If a Hydrographic Office believes that, by using information obtained from a commercial product, a danger to life, property or the environment may result, the Hydrographic Office should take such action as it may deem appropriate to fulfil its responsibilities in the field of maritime safety. This should not be construed, however, to mean that Hydrographic Offices have responsibilities for inspecting the products of commercial organizations (see Section 3 below).
  - d) Legal matters, matters of copyright and of charges to be paid are different in each country and are very complex. They are left to the discretion of each Member State.
  - e) Commercial organizations developing products *should* be required to state clearly on their products the following:
    - i) That the information being presented does not replace obligatory navigation material.
    - ii) That where the original data were provided by a Hydrographic Office, a disclaimer should appear that, as the Hydrographic Office has no control over the product, it cannot accept any responsibility for it, except for those parts of the product which are a complete and true reproduction of official predictions issued by the Hydrographic Office.
    - iii) A sample product may be required to be made available to the Hydrographic Offices responsible and/or to each donating authority prior to distribution, to ensure the imposed conditions are honoured. The Hydrographic Offices concerned should respond within a mutually acceptable time scale.
    - iv) The data remain the property of the donating agencies.

3 Recommendations for Standards to be applied in connection with the inspection of the products of Commercial Organizations

- a) Inspection of commercial products by Hydrographic Offices *is not recommended* as examination may imply approval with its attendant responsibilities and liabilities.

**RECOMMENDATION:** Two new resolution be created to include metadata information be stored for all tide readings and all tidal stream/current readings. This is recommended as there is a metadata resolution for tidal constituent banks. Something along the lines of:

<b>Metadata for Tide recordings</b>			<b>A6.10</b>
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1. It is recommended that Hydrographic Offices should store the following metadata information for each location for which tide data is recorded and stored:

- a) Location identification by number, name, country, body of water, and geographic or GPS/GNSS coordinates;
- b) Equipment make and model, date installed, time zone, and duration of data collection;
- c) Identification of geodetic levelling datum, and date of reference to this datum, elevation of mean sea level and, where applicable, the connection to and identification of the appropriate bench mark(s); and
- d) Periods of data available and periods of missing or unusable data

<b>Metadata for Current recordings</b>			<b>A6.11</b>
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1. It is recommended that Hydrographic Offices should store the following metadata information for each location for which currents data are recorded and stored:

- a) Location identification by number, name, country, body of water, geographic or GPS/GNSS coordinates, and depth, including which datum it is applied to;
- b) Equipment make and model, including frequency, date installed, time zone, and duration of data collection;
- c) Periods of data available and periods of missing or unusable data;
- d) Orientation (upward, downward or horizontal); and
- e) For profiles, the size and number of data cells.

## SECTION 2.4.7 – PUBLICATIONS – TIDE TABLES

- G1.1 [Mean sea level symbols](#)
- G1.2 [Time to be used](#)
- G2.1 [Translation of headings, etc](#)
- G3.1 [Information to be given in Tables](#)
- G3.2 [Mean Sea Level](#)
- G3.3 [Mention of origin of tidal predictions](#)

TITLE	Reference	Last amendment (CL or IHC)	1 <sup>st</sup> Edition Reference
<b>MEAN SEA LEVEL SYMBOLS</b>	<b>7/1937 as amended</b>	<b>IHC 7</b>	<b>G1.1</b>

It is resolved that the following symbols shall be used in nautical publications to denote:

- Zoo The best practical figure which can be obtained for the height of mean sea level referred to the datum in general use;
- Zo Height of mean sea level, as obtained from any individual analysis, above chart datum;
- So Height of mean sea level, as obtained from any individual analysis, above the zero of observations; or
- Ao Height of mean sea level as obtained from any individual analysis above an arbitrary datum different from chart datum or the zero of observations.

<b>TIME TO BE USED</b>	<b>27/1919</b>	<b>44/2014</b>	<b>G1.2</b>
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1 It is resolved that the time system employed in printed Tide Tables shall be Standard Time as observed at the port.

2 It is resolved that daylight saving time shall not be used in the predictions in the printed Tide Tables but that a notice or caution relative to its use and the period of its application shall be included therein.

3 It is strongly recommended that the time system employed in Digital Tide Tables (DTT) published in web sites shall be Standard Time as observed at the port, without daylight saving time application. A notice or caution relative to its use and the period of its application shall be included therein. Additionally, DTT can offer to the user the possibility to set automatically another time system.

<b>TRANSLATION OF HEADINGS ETC.</b>	<b>7/1926 as amended</b>	<b>34/2005</b>	<b>G2.1</b>
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It is recommended, principally for those Tide Tables which are not published in Roman characters, that the headings of divisions and columns include a translation in English, French or Spanish, in order to increase the international usefulness of the publication.

<b>INFORMATION TO BE GIVEN IN TABLES</b>	<b>28/1919 as amended</b>	<b>IHC 8</b>	<b>G3.1</b>
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It is resolved that Tide Tables shall include:

- a) Detailed predictions for the ports chosen as standard ports; these predictions may consist of either the time and height of high and low water or the hourly heights of the tide; and

- b) Special tables giving data required for calculating, from the predictions for the standard ports, the corresponding predictions for the secondary ports.

<b>MEAN SEA LEVEL</b>	<b>29/1919 as amended</b>	<b>IHC 4</b>	<b>G3.2</b>
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It is resolved that the height of mean sea level above chart datum ( $Z_0$ ) shall be stated clearly in Tide Tables and in a concise manner on charts.

[See also 7/1937 \(G1.1\).](#)

<b>MENTION OF ORIGIN OF TIDAL PREDICTIONS</b>	<b>6/1947</b>		<b>G3.3</b>
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It is recommended that the Hydrographic Offices which publish predictions supplied by other countries give the origin of such predictions in their Tide Tables.