HSWG5 S-44 Updates Next Steps

Lombok, Indonesia
2 - 5 October 2023

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

MEASURING THE PHYSICS & FEATURES OF THE OCEAN

Bathymetric Coverage

International Hydrographic Organization

Clarify Bathymetric Coverage Criteria

One Proposal - Point distance/density approach as coverage requirement

Decisions:

- Retain Feature Detection category requirement
- Section 3.5 Bathymetric Coverage text update

  "The concept of bathymetric coverage was introduced in this edition of S-44, in order to make the standard technology independent. Acquisition of bathymetric coverage requires use of a sensor that measures or derives ~~and records~~ depths. Table 1 specifies the minimum bathymetric coverage to be achieved by each survey order."

Actions:

- Create Bathymetric Coverage Project Team
  - Clarify Bathymetric Coverage Criteria (long term)
  - Clarify "200% coverage" for next edition

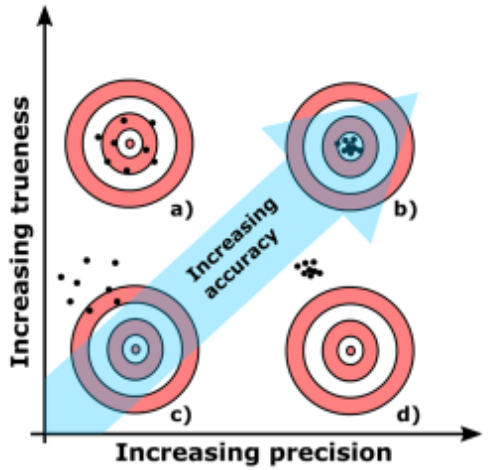
Uncertainty

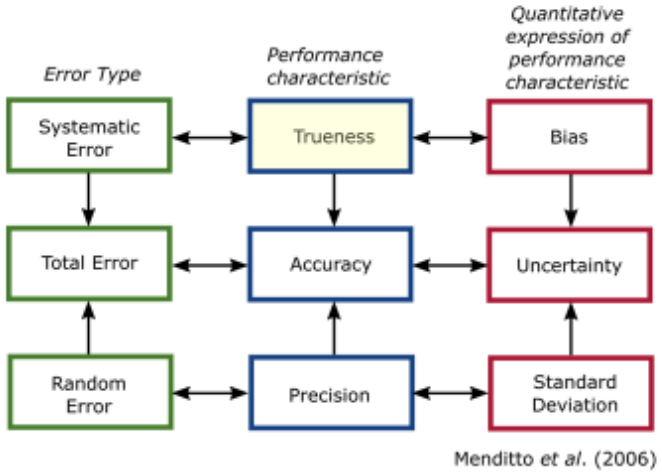
Action:

- HSWG Members - review proposal on the concept of Uncertainty
- Uncertainty project team to write paper
- HSWG Chair Group will share paper with DQWG

ALIGNMENT OF IHO WITH JCGM

Recommendation #2-1:
U subWG agrees to evaluate the consequences of adopting the JCGM/ISO 5725-1:2023 viewpoint on *Accuracy (trueness and precision) of measurement methods and results* .





Menditto *et al.* (2006)

Clarifying the concepts of a priori and a posteriori

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Next Edition:

~~"During the survey~~, ~~eE~~stimations of the equipment and environment uncertainties should be adjusted or assessed. By this ~~adjustment~~, the a priori uncertainty is ~~adjusted~~ updated during the survey ~~improved~~."

Action:

- Uncertainty project team to identify any other a priori/posteriori updates for next edition

ANNEX C GUIDANCE FOR *A PRIORI* AND *A POSTERIORI* QUALITY CONTROL

Note: This annex is **not** an integral part of the S-44 Standards and will be removed when the information therein is fully incorporated into IHO Publication C-13, *Manual on Hydrography*.

The S-44 standards refer to quality standards for both *a priori* and *a posteriori* results. In this guidance a brief view on how to determine the uncertainties for *a priori* and *a posteriori* is given. Determining uncertainties is necessary for any technique used in hydrographic surveys. Methods to establish the uncertainty may differ greatly for each survey technique used.

C.1 *A Priori* Uncertainty

The *a priori* uncertainty is a theoretical value based on best practise estimations of all factors affecting the measurements. Each instrument used in the measurement and the environmental influences will add uncertainties to the grand total. Calculating the total uncertainty horizontally and vertically prior to the survey will affirm to the hydrographer that the required survey standards will be feasible with the selected equipment in the environment of the survey area. If the survey standards are not achieved, other equipment or survey techniques may be necessary for that particular environment.

During the survey, estimations of the equipment and environment uncertainties should be adjusted or assessed. By this adjustment, the *a priori* uncertainty is improved.

Metadata

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Changes in Chapter 6 Metadata and IHO M-3

Align with:

- 4/1932 Metadata for Oceanic Soundings
- 3/1929 Centralization of Oceanic Soundings
- S-100 & Other IHO Publications

Action:

- Create a metadata project team
- Identify updates for next edition

Publication M-3 – 2nd Edition 2010 - Updated July 2023

Resolutions of the International Hydrographic Organization

METADATA FOR OCEANIC SOUNDINGS	4/1932 as amended	85/2008	A5.2

It is resolved that oceanic soundings, together with the metadata and potential additional supplementary information, shall be collected and exchanged mainly in digital form.

Metadata should comprise at least information on:

a) the survey in general as e.g. date, area, equipment used, name of survey platform;
b) the geodetic reference system used, i.e. horizontal and vertical datum; including ties to WGS 84 if a local datum is used;
c) calibration procedures and results;
d) sound velocity;
e) positioning information e.g. GPS, RT-DGPS, GLONASS, GALILEO;
f) tidal datum and reduction (if applicable); and
g) accuracies achieved and the respective confidence levels.

CENTRALIZATION OF OCEANIC SOUNDINGS	3/1929 as amended	IHO A-1	A5.3

1 Full details of the information required to accompany data, and the criteria for its quality control, are contained in the GEBCO Cook Book (IHO Publication B-11).

2 Data Storage and exchange of data.

a) Member States are requested to remind institutions and organizations within their own country of the desirability of collecting bathymetric data, whenever possible, in the course of oceanographic missions.

b) It is recommended that Member States inform the IHO Secretariat of any details concerning recent bathymetric data collected by themselves or by other national institutions and organizations, about which they may have been notified. The standard format below should be used for this purpose:

i) Country of origin;

ii) Institution or authority responsible for the mission;

iii) Name of vessel which carried out the soundings;

iv) Date (month and year);

v) Location (general sea area or significant points along track); and

vi) Terms under which data may be obtained (address for requests, method of ordering, price, or whether free on a mutual data exchange basis, etc.).

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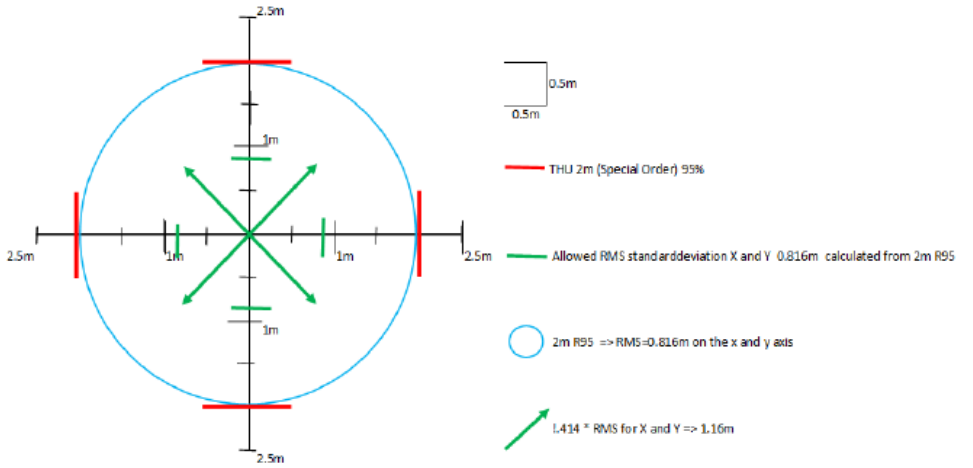
Calculations for THU



We actually calculate the Hypothenus of a square triangle and our uncertainty is within one of four vectors.
Wy not allow any vector of the same size?

Action:

- Uncertainty project team will:
  - Identify if there is an issue with the THU values as currently written in S-44
  - If so, identify potential solutions

Alternatives

- Keep the present THU Values, but **change the calculation for the R95 to be:**
  1.73*DRMS (using the DRMS= Distance Root Mean Square formula), then the RMS uncertainties x or y will be allowed to be larger than 0.816 as long as the opposite axis are considdrably smaller to "stay within the circle".
- Keep the calculation as it is today, being slightly stricter than if we allowed the use of RMS for both axis separate.
  Would though need some rewording to clarify that it is the maximum of X or Y uncertainty to use.
- Do nothing at all.