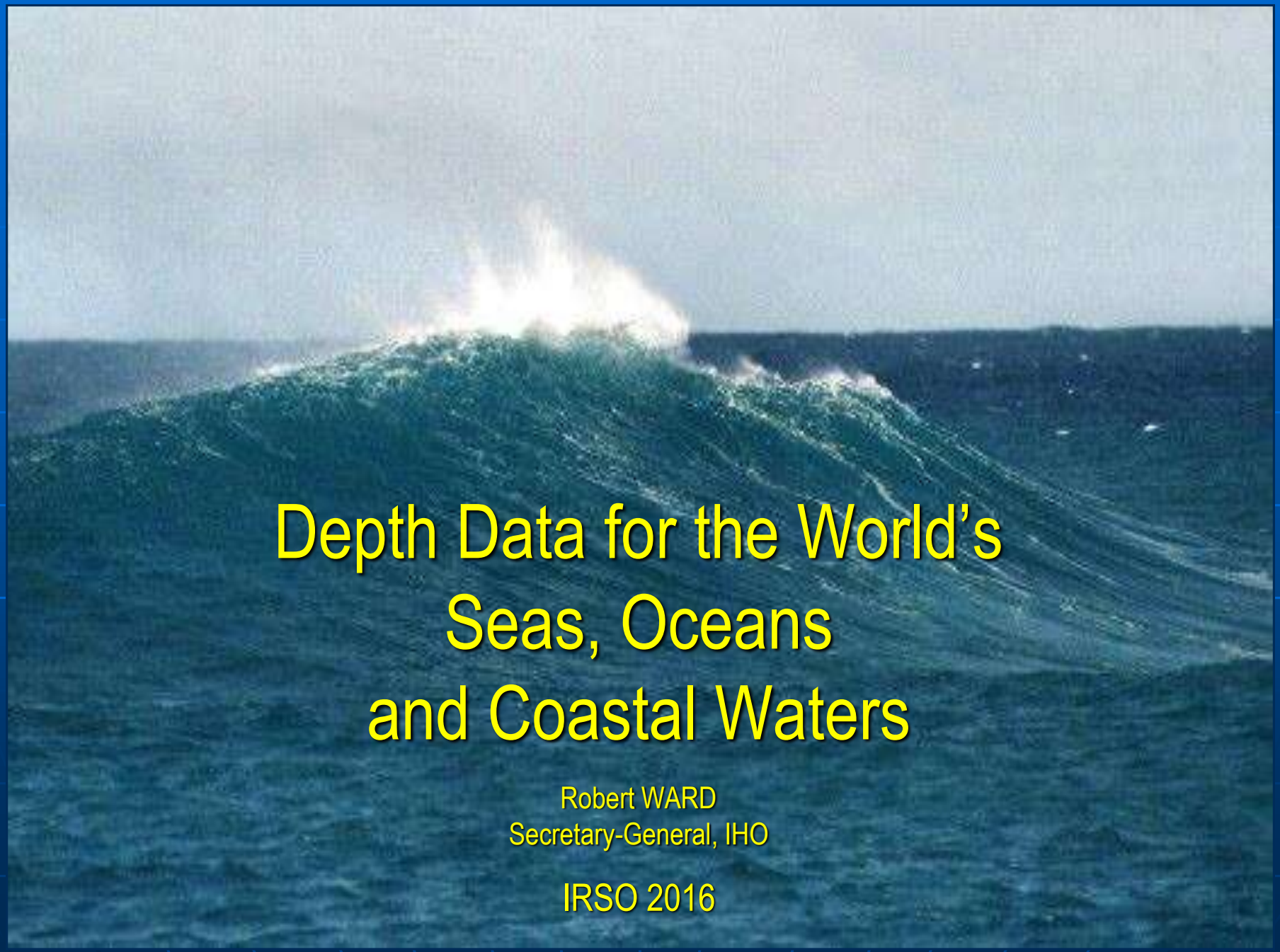


Depth Data for the World's Seas, Oceans and Coastal Waters

Robert WARD
Secretary-General, IHO

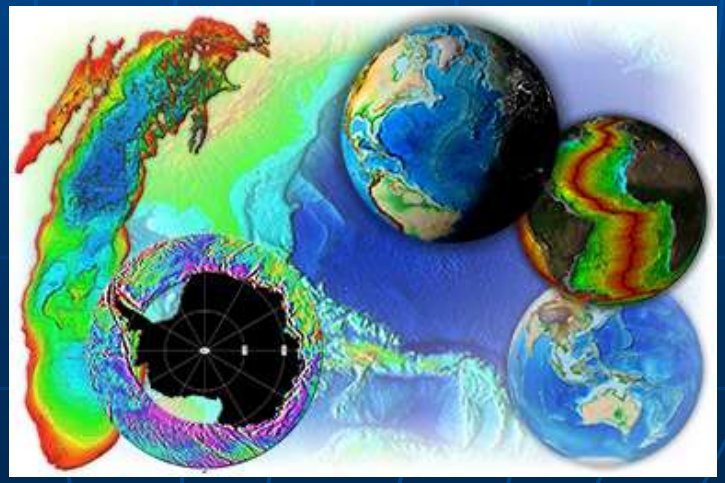
IRSO 2016

International Hydrographic Organization

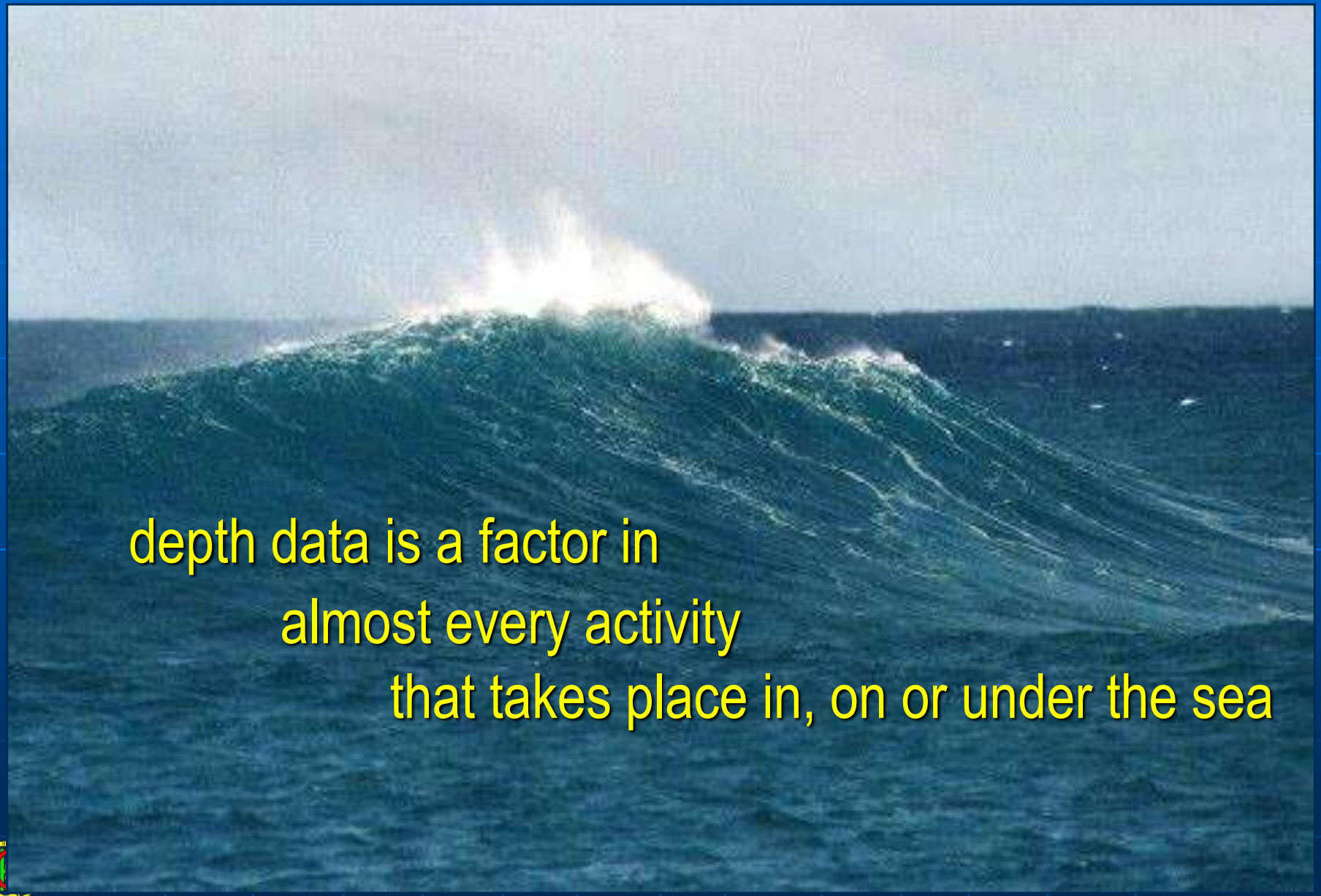
- Intergovernmental Consultative and Technical Organization
- 85 Member Countries
  - … ensure that all the world's seas, oceans and navigable waters are surveyed and charted (mapped)
  - Coordinate delivery of hydrographic services worldwide
  - Provide the international standards and guidelines for hydrography

International Hydrographic Organization

- Maintains global reference dataset of bathymetry
  - IHO Data Centre for Digital Bathymetry
  - IHO-IOC General Bathymetric Chart of the Oceans – GEBCO project
    - Regional Ocean Mapping Programs
    - GEBCO grids



Why is depth important ?



So, what do we know about the depth of the sea ?

Higher resolution maps of the Moon and Mars !

- Mars
  - - resolution > 20m
- Moon
  - - resolution > 7m
- Most Seas and Oceans – tens and hundreds of miles, not metres !!

So, what do we know about the depth of the sea ?

~ 15% of ocean depths are directly measured

IHO-IOC GEBCO 2016

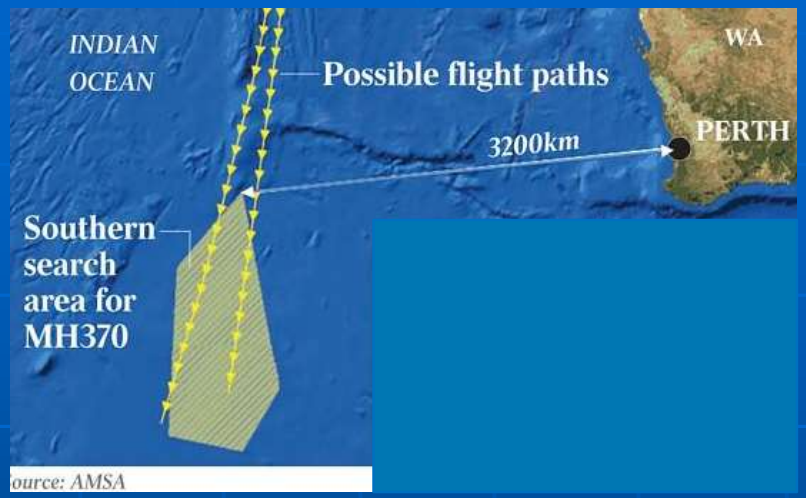
- remainder is inferred

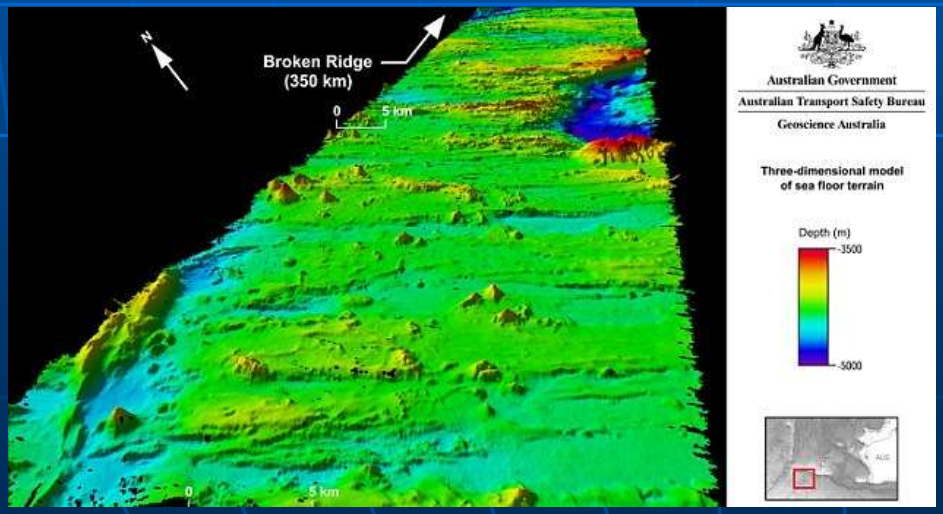
~ 50% of world's coastal waters are unsurveyed

IHO publication C-55

What does this mean ?

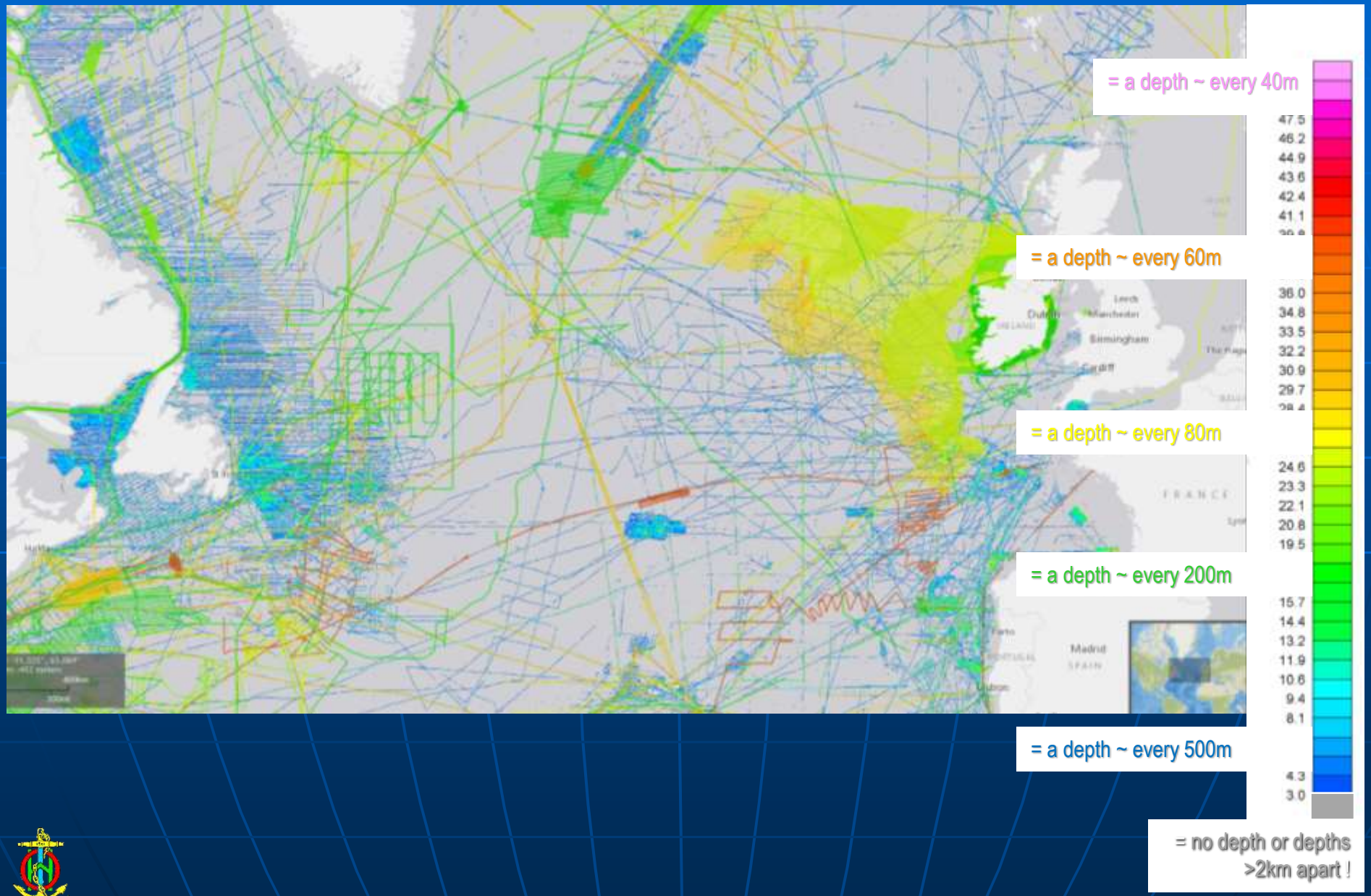
- Example: MH370
  - Original base map for search (~300^2 miles) derived from only 2 principal lines of 1960's depth soundings + satellite gravity obs.





- 1500 metres deeper than expected
- numerous submarine canyons and seamounts
  - all previously unknown

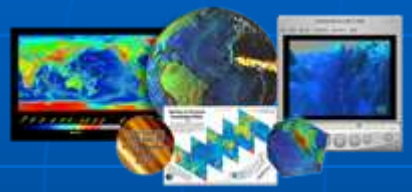
GEBCO data – N. Atlantic: Plot of depth soundings /2km²



So, what can we do ?

- Increase bathymetric data collection
  - encourage holistic government survey and data gathering programmes
    - collect once - use many times
    - share resources
- Data discovery - make old data discoverable
- *Crowd-sourcing* by mariners and scientists
  - collect data on all voyages, whenever possible

Where should your bathymetric data go ?



- IHO Data Centre for Digital Bathymetry (DCDB)
  - hosted by NGDC (NOAA), Boulder – USA
    - global data and data discovery portal
    - upload data and/or metadata
    - download data

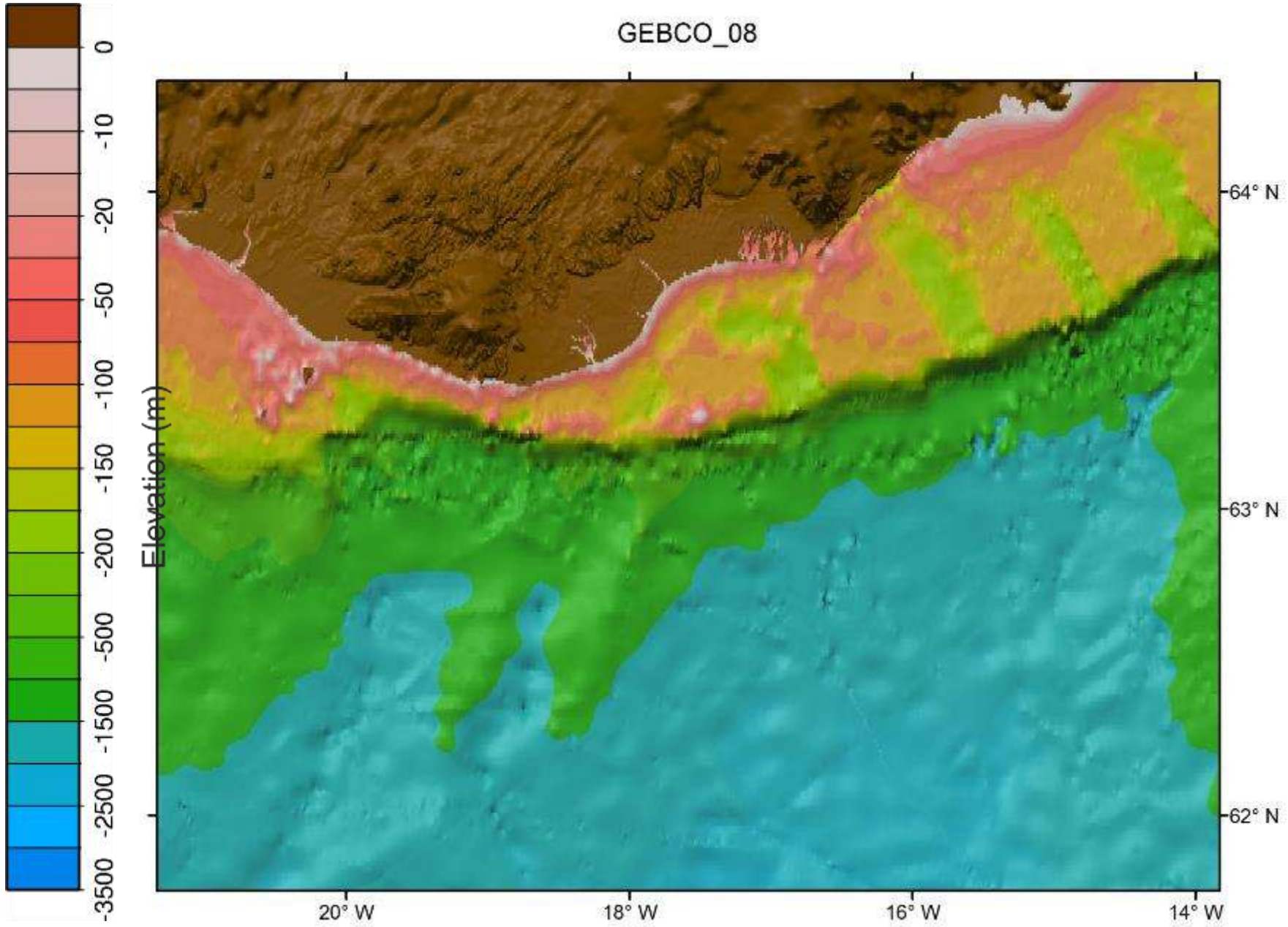
- IHO-IOC General Bathymetric Chart of the Ocean (GEBCO)
    - the global bathymetric dataset
    - gridded reference data

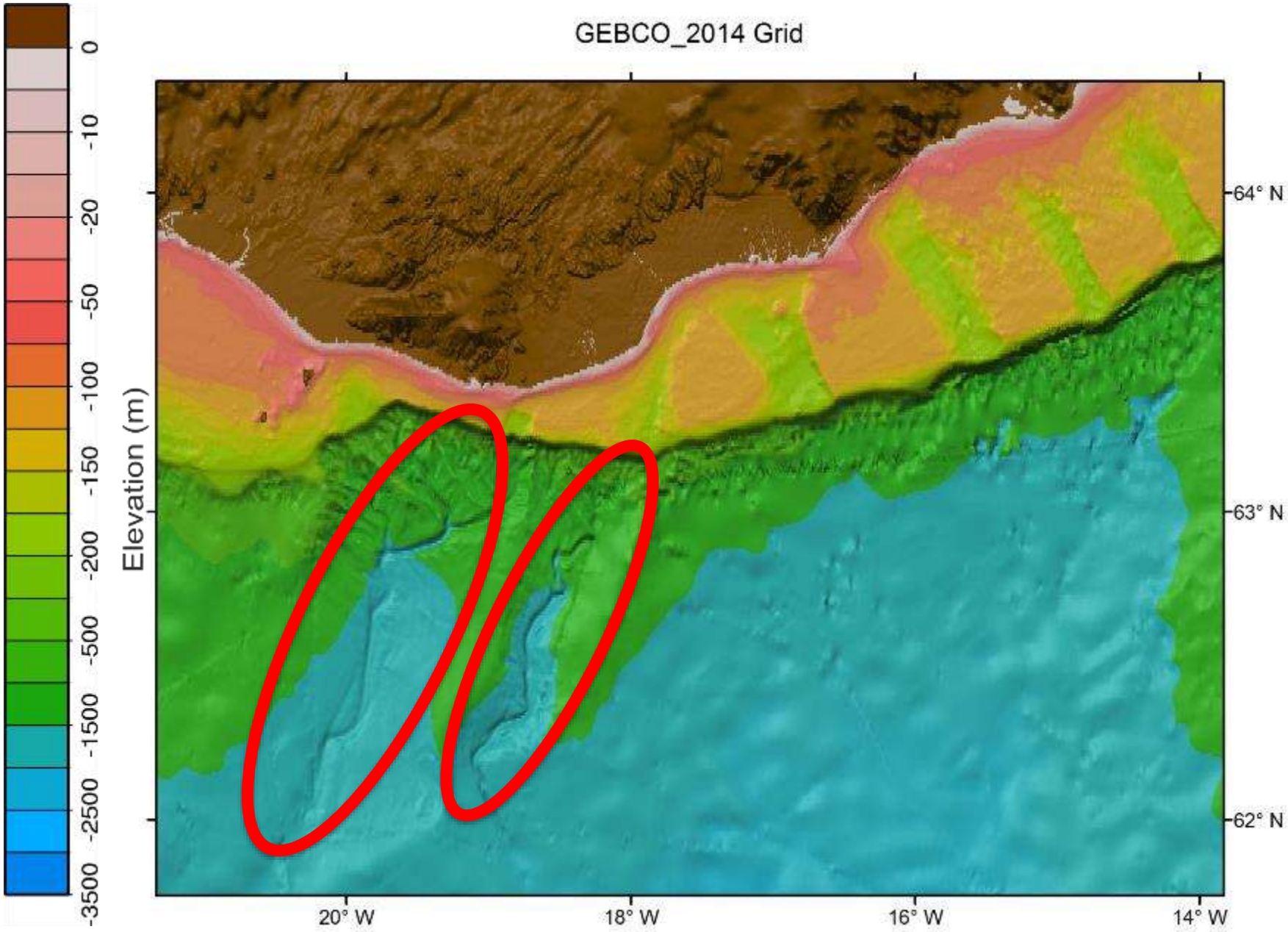
Crowd-sourcing: a low-cost, high impact IHO solution for the future …

- low cost data logger
  - ship's echo sounder
  - ship's GNSS
- collects *x,y,z,t*
- ~ $150
- easy installation
- direct upload portal to IHO DCDB in 2017

Loggers

- *Sea-ID*
- *TeamSurv*
- *Olex*
- *Rose Point Navigation Systems*
- .....


GEBCO_08
Elevation (m)
0
-10
-20
-50
-100
-150
-200
-500
-1500
-2500
-3500
64° N
63° N
62° N
20° W
18° W
16° W
14° W


GEBCO_2014 Grid
Elevation (m)
0
-10
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-50
-100
-150
-200
-500
-1500
-2500
-3500
64° N
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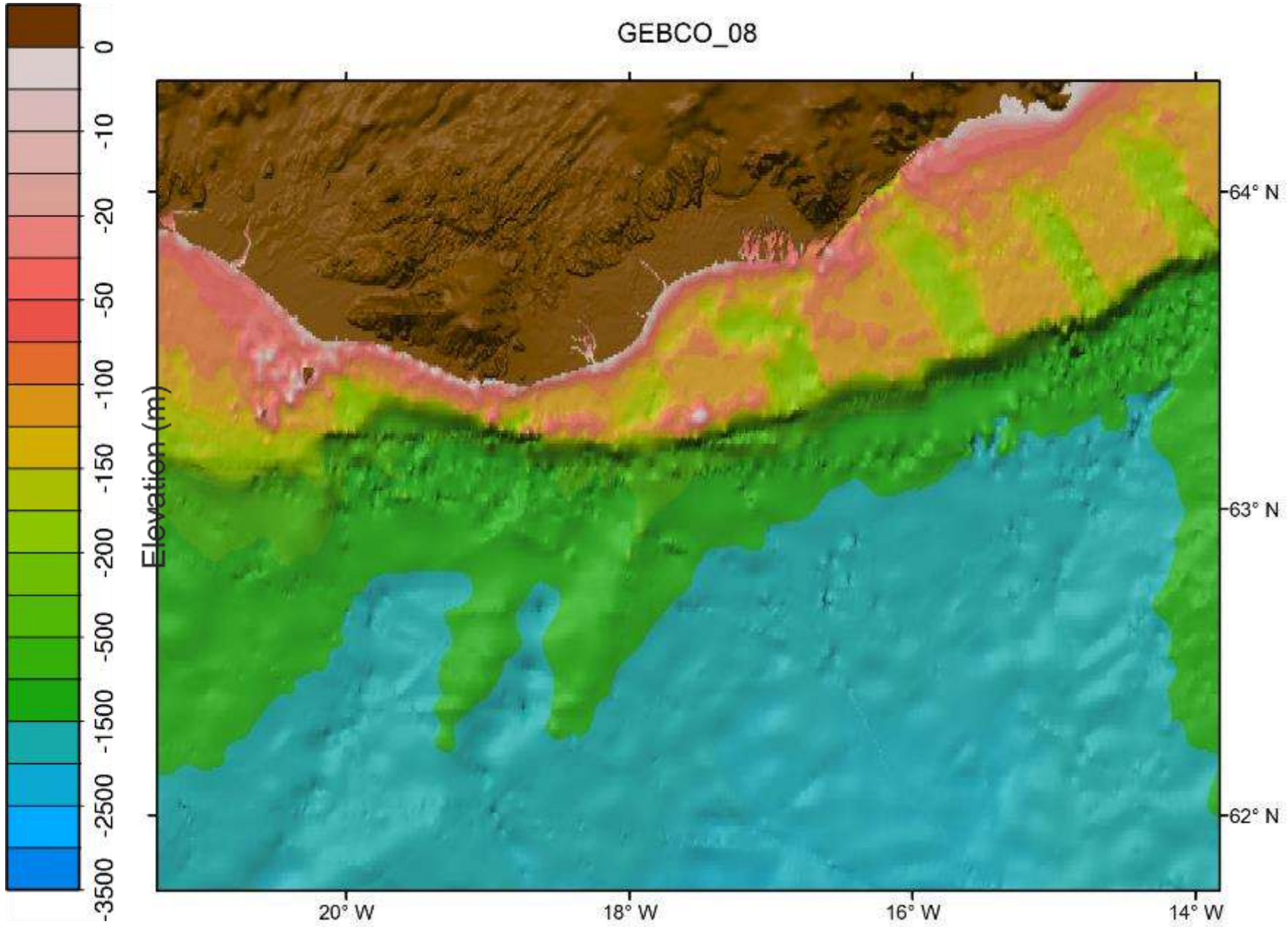
62° N
20° W
18° W
16° W
14° W


GEBCO_08
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64° N
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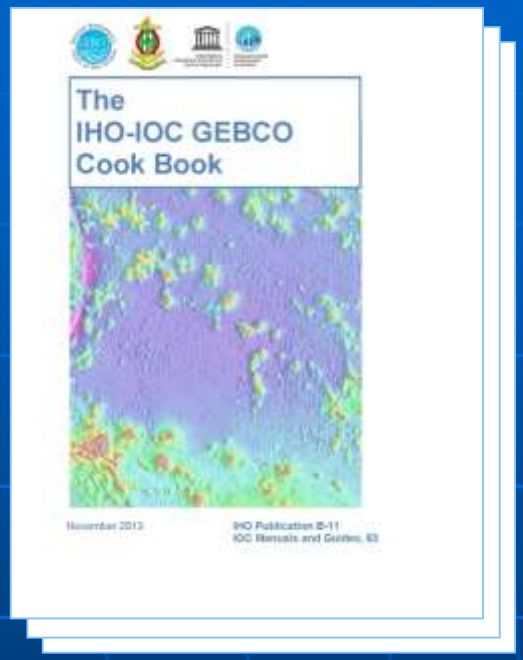
62° N
20° W
18° W
16° W
14° W

Technical guidance for bathymetry data gatherers



- IHO publication B-11 - *IHO-IOC GEBCO Cookbook*

download: *www.iho.int*

Summary

- data coverage is very poor and improving only very slowly
- waiting for surveying ships is NOT an option !
- hidden or lost data should be identified and made discoverable
- all ships at sea can be collecting useful depth data - using existing equipment

SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

- Targets:
  - ….
  - **<u>increase scientific knowledge</u>**

Pretexts for inaction ...

- Too expensive

  Answer: ● Basic equipment is already in the ship; + logger ~250€

- No technical staff to tend equipment

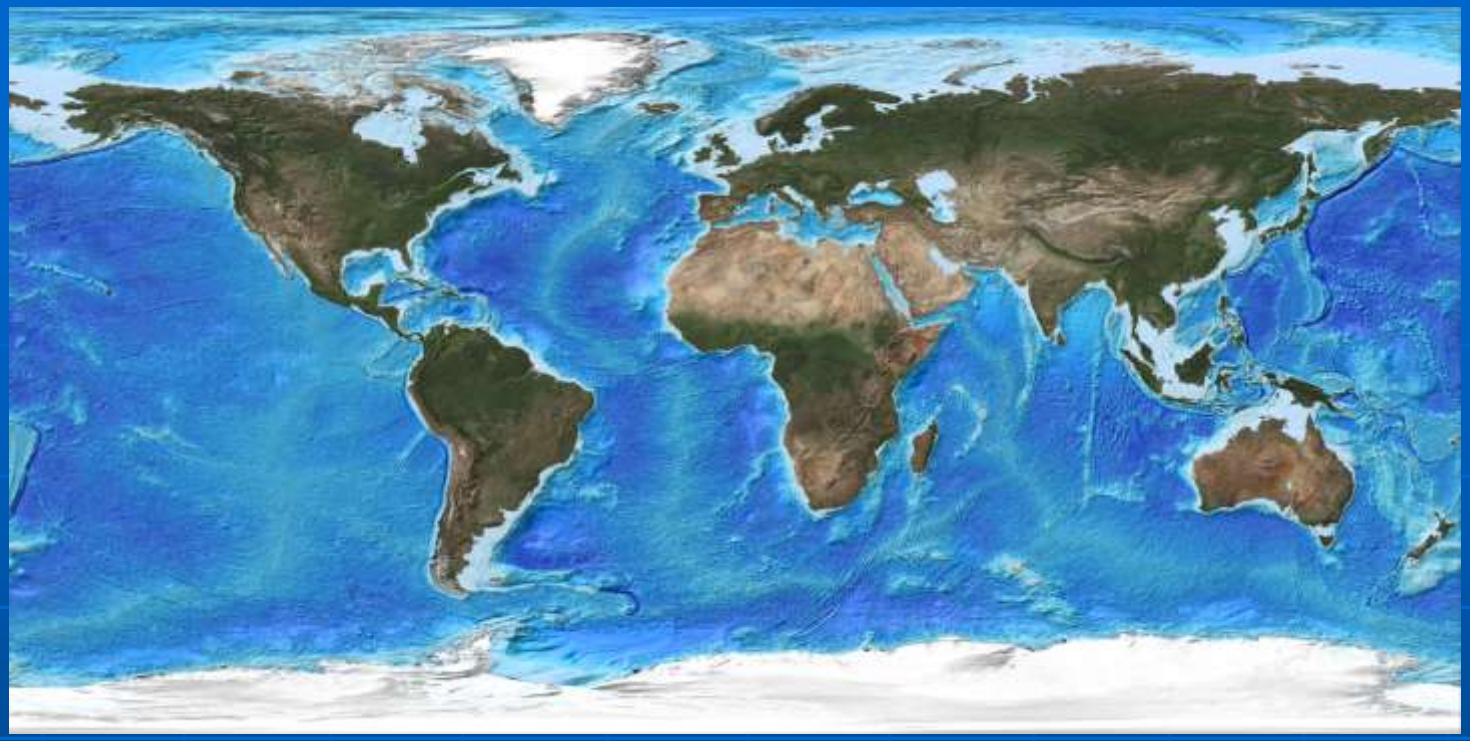
  Answer: ● Not required for ship's navigation equipment

- Might compromise "innocent passage"; UNCLOS

  Answers: ● GEBCO data has been forwarded since 1903
  ● UN SDG 14 – more scientific data required
  ● Declare intention, provide data to HO

- Environmental noise

  Answer: ● No evidence of additional stress at E/S frequencies



My take-home messages:

… The ship's echo sounder should be running and recording whenever possible

… Existing depth data, collected for whatever reason, should be made discoverable