How to map the floor of an entire ocean – a new text book : work in progress

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APPROACH

The range of countries in which potential readers reside has increased tremendously in recent years More than **60** Coastal States have established or are attempting to establish, juridical continental shelves, which must be mapped and managed.

The Nippon Foundation Training Program has tripled the number of countries participating in GEBCO: 54 Scholars have been trained. There is a need to help the scholars stay up to date, and for them to be able to pass their knowledge to others in their home countries.

GEBCO intends to provide on-line education in Bathymetric Mapping, and course material is required. The book will provide a central element to training and education material in Ocean Bathymetry and be a standard reference in both developed and developing countries, for direct or remote use.

The language will initially be English, written as clearly as possible given that many readers will not have English as their first language.

INCLUDE

* Words - A traditional style text arranged in Chapters and subchapters- see outline box

* Sidebars – Mini-sections about related topics but whose inclusion in the main text would interrupt the flow – see sidebar box

* Figures – many, many
* Animations (via links?) – graphics and tables
* Links – to websites and data sets
* Questions, exercises, projects for students
* References

(Not all will appear in the First Edition)

TIMELINE

THE NEED

There is no textbook about producing deep ocean, wide-area bathymetry.

While there is a lot of published material about mapping small areas with intense human use, particularly shallow, high-traffic shipping lanes and harbors, this valuable body of literature applies, to large extent, to the collection of one set of measurements using one set of instruments and software.

However, maps of large areas, ocean basin wide and larger, must be made from an assemblage of data of different types, accuracies and provenances collected over many years. Although this is what GEBCO does, nowhere is the process described in a format that others can learn from and emulate.

This poster: a) reports on progress in the preparation of a book explaining the processes involved in making such assemblages and then making maps and grids from the assembled data and b) invites your comments and suggestions.

INTENDED READERSHIP

MAP MAKERS
GEBCO and other wide area maps are produced primarily by two groups of professionals with different educational backgrounds: Geoscientists and Hydrographers. The book must contribute to the knowledge of both.

Although primarily intended for beginners, it is hoped that very experienced practitioners also will benefit.

Some readers will deal with new data only: for them, the book is organized so that readers who only deal with modern new data (GPS multibeam) can read about that without having to read the sections on the older data. Reading it in its entirety deals with all the data, i.e. old data and modern data.

MAP USERS
As well as providing an instructional manual on how bathymetric maps of large areas are prepared, this book provides non-specialists with an overview of the strengths and limitations of bathymetric maps.

1. Introduction
  1.1 Scope of the issue
  1.1.1 Size of the ocean
      1.1.2 Rates of Progress
      1.1.3 Do we need 100% coverage?
      1.1.4 Elements of the rates of progress
  1.2 Present and future uses for bathymetry
      1.2.1 Example of MPA
  1.2.2 Example of Tsunami
      1.2.3 Further examples of use

2. Cartography
  2.1 What are maps?
  2.2 The primordial lie is the change of scale.
  2.3 Resolution of maps and measurements.
  2.4 Generalization
  2.5 How do we map anything?
  2.6 A perfect map would, AT ITS SCALE**:**

3. Types of seafloor maps produced to date
  3.1 Navigational and scientific seafloor depictions
  3.2 Deep Ocean Differs From Inshore Areas

4. Measurements in Theory
  4.1 Measurements as numbers
      4.1.1 Redundancy
      4.1.2 Numerical Error and Uncertainty
  4.2 Measurements as Spatial Samples
      4.2.1 Distribution of spatial samples
  4.2.2 Sample error and uncertainty
  4.3 Put the two types of errors together

5.Types of measurements used in bathymetry
  5.1 Acoustics
      5.1.1 Single beam echo sounder
      5.1.2 Multi beam echo sounder
      5.1.3 Side Scan Sonar
  5.2 Non-acoustic methods
      5.2.1 Satellite Altimetry
  5.2.2 LIDAR
  5.2.3 Other Systems.

6. From measurement to data
  6.1 Meta Data
  6.2 Combined Error and uncertainty
  6.3 An Ideal data Set

7. From Data To Surface
  7.1 Fundamental Assumption
  7.2 Interpretation
      7.2.1 Gridding
      7.2.2 Surface Fitting
      7.2.3 Non-Numeric Methods
  7.3 Surface and Grid Uncertainty

8. Organizing to map the oceans
  8.1 GEBCO
  8.2 The Role of Standards.
  8.3 Data Bases and Data Centers

9. Stages in the production of large area maps and grids
  9.1 Data Assembly
      9.1.1 meta data about the map
      9.1.2 Inclusion of existing maps
  9.2 Role for GIS
  9.3 Quality Assurance—determining uncertainty
  9.4 Map Design
  9.4.1 Model map designs
  9.4.2 Portraying uncertainty
  9.5 Grids
  9.6 Nomenclature
  9.7 Dissemination and Updating

YOUR PARTICIPATION IS WANTED

All comments and advice welcome

Review
You can review the current draft by downloading it at ftp.ccom.unh.edu. Account = anonymous, Password = your email address, Folder MonahanText
It contains the following files:

Text - a text only Word doc
References - my working list of references keyed to chapters. If you are not included, you should be - please send me your applicable references or suggest others
Figures - ppt of figures keyed to chapters. I think this is the weakest category. Please send your figures for inclusion - or suggest others

PUBLISHING AND DISTRIBUTION

The world of publication is changing very rapidly: will try to use the most valuable modern approaches and not go down any blind alleys

Probably first edition will be both a (print-on-demand) paper book and an eBook - subsequent editions will increasingly web-based with hot links to exercises and animations

I hope the book will be published by GEBCO or CCOM or both in partnership. Even more, I hope that it will be updated by successive generations of GEBCO and CCOM members.

FOR FURTHER INFORMATION
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