

## **Shallow Water Bathymetry to Improve the IHO /IOC GEBCO Grid**

### **Introduction**

Seventy one percent of the Earth surface is covered by water, yet the world's oceanic areas remain poorly mapped overall. Knowledge about the nature of the Earth's ocean floor has the potential to influence our quality of life, yet the surfaces of other planets, moons, and asteroids have been mapped better than those of our oceans. The primary reason for this is a lack of bathymetric data, especially in areas beyond the continental shelf. This is largely due to the very high costs of collecting bathymetric data, and a worldwide lack of coordination that has resulted in an unfortunate duplication of effort in certain areas and no effort in others. Furthermore a lack of cooperation between data collection agencies has resulted in valuable bathymetric data not being made available for mapping purposes.

### **GEBCO Ocean Mapping Project**

Since 1903 the GEBCO Project has been collecting bathymetric data and mapping the Earth's oceans. GEBCO is an IHO and IOC Project that relies largely on the voluntary efforts of an international collaborating community of scientists and hydrographers with the support of their parent organizations.

The goals of the IHO-IOC GEBCO Project are to:

- 1) Develop and constantly improve the authoritative description of global ocean depths;
- 2) Act as the designated international authority for undersea feature names.
- 3) Advance the development and application of sea floor mapping technology;
- 4) Encourage and facilitate scientific cooperation leading to the exchange and preservation of bathymetric data and associated metadata;
- 5) Foster collaboration among individuals and organizations with established and developing expertise so as to assist local and regional mapping efforts to attain a global standard of quality;
- 6) Identify oceanic areas that are insufficiently surveyed and recommend to surveying and/or ocean-going organizations and institutions that such areas are mapped;
- 7) Promote education and training in ocean mapping;
- 8) Bring together ocean mappers and users of bathymetry thereby leading to products that are more widely used in science and education.

Since its inception, the GEBCO Project has produced five world map series, a (maintained) gazetteer of undersea feature names, several gridded datasets and other maps and datasets. GEBCO products have traditionally focused on deep ocean mapping with sparse depiction in shallower areas. Shallow water areas are however extremely important for scientific purposes, and their depiction needs to be improved in GEBCO products.

### **Requirement for Improved shallow water bathymetry**

According to a World Resources Institute study (2001), 20% of the World's population lives less than 16 miles away from a coastal zone and 39%, or 2.2 billion people, live within 60 miles of the coast. Adequate data within the coastal zone is of tremendous importance for many activities such as coastal zone management, environmental protection and other critical preventative studies such as tsunami modeling and inundation prediction.

### **GEBCO Grids**

Unfortunately maps and datasets within the coastal zones are generally diverse in format, quality and coverage and often difficult to obtain.

The GEBCO One Minute Grid aims to provide consistent bathymetry data on a global scale, and also includes a continuous digital terrain model for both ocean and land areas. GEBCO has recognized shallow water areas need to be improved, and has requested IHO Member States to contribute bathymetric data for these areas.

As most hydrographic organizations are not in a position to provide high density bathymetric data (e.g. survey fair sheets), GEBCO has requested IHO Member States to provide lower density bathymetric data extracted from hydrographic products such as grids, ENC's soundings or paper chart production system.

IHO Circular Letter 36 of 2006 invited Member States to provide low density shallow water bathymetry for their coastal areas. To facilitate the extraction of soundings and contours from ENC cells, a software application was developed and distributed with CL 36 (on CD ROM). Only data from ENCs in usage bands 2 and 3 were requested as it was felt that these best suited the requirements of GEBCO. Figure 1 below shows the extent of shallow water bathymetric datasets (which were mostly extracted from ENCs), provided by IHO Member States so far.

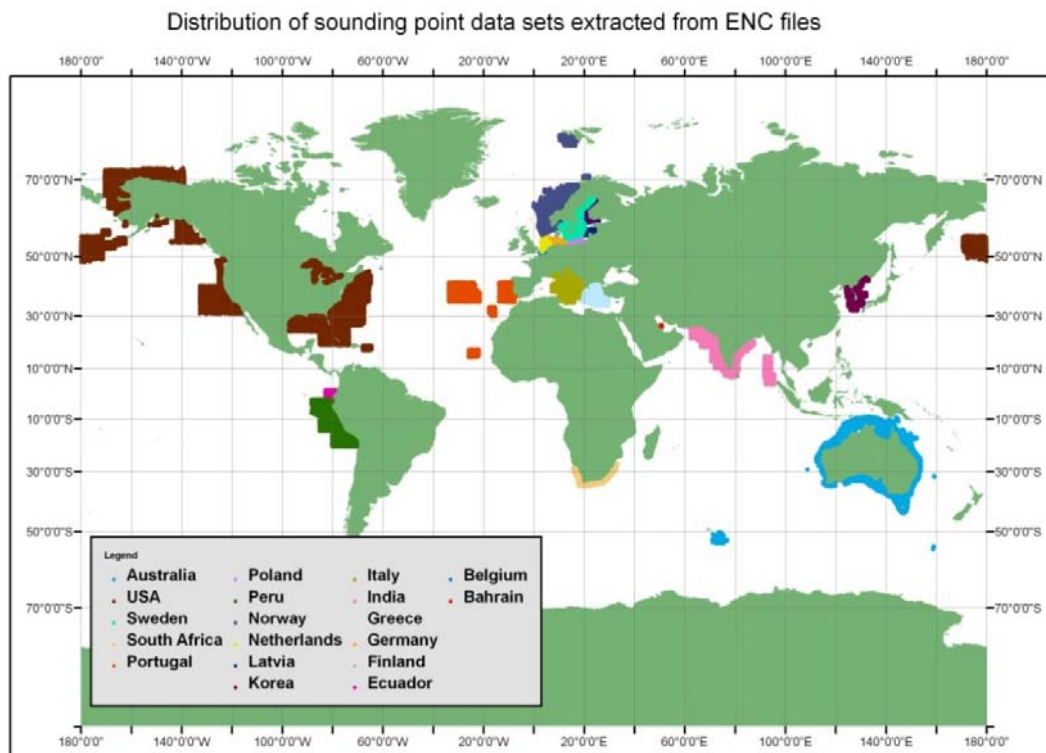


Figure 1 –SWB sounding data provided by IHO Member States (mostly from ENCs).

These datasets have resulted in significant improvements to the GEBCO grid (especially in shallow water) in those areas for which data was provided. (IHO Circular Letter 14 of 2007 reports on the improvements for a sample area).

Figure 2 shows the extent of bathymetric data available from the IHO Data Centre for Digital Bathymetry (DCDB) for the North Indian Ocean Regional Hydrographic Commission.

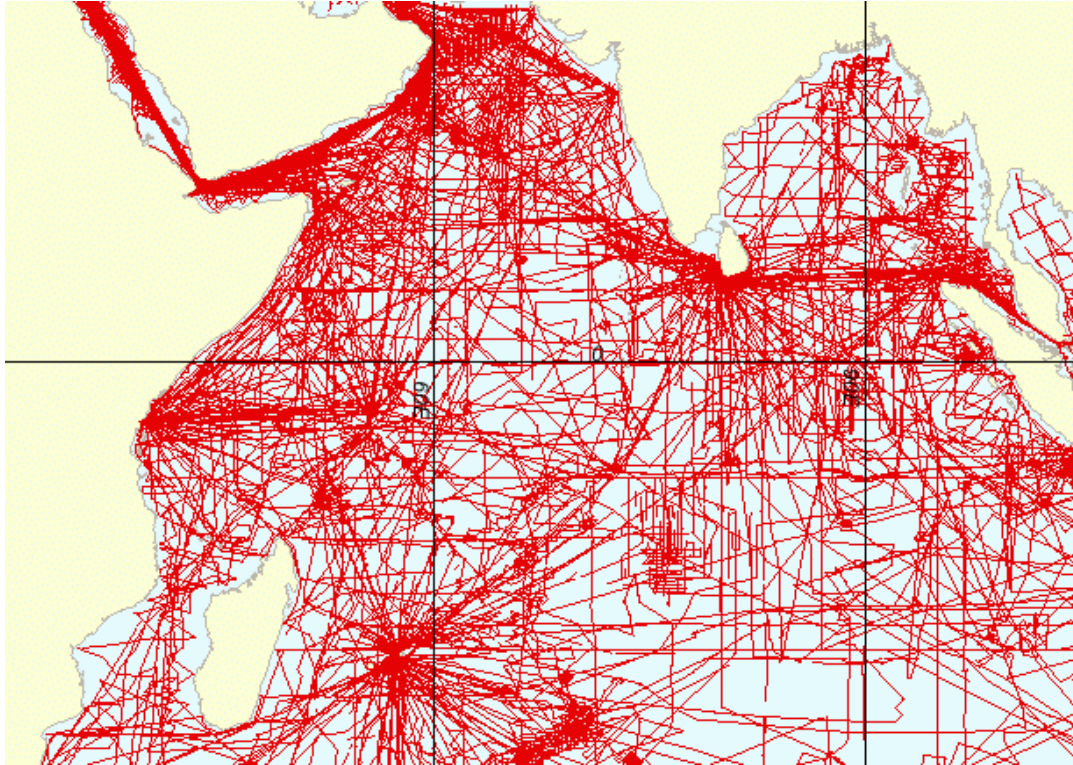


Figure 2 – Track line survey data from the IHO DCDB

NIOHC members are encouraged to contribute shallow water data, either from existing gridded datasets (if available), or from ENCs or paper chart production databases. Bathymetry from ENCs of navigational purposes 2 and 3 are best suited to the GEBCO grid resolution. It is requested that all data should be sent to the IHB ([pad@ihb.mc](mailto:pad@ihb.mc)). Further information on the GEBCO grid is available from the GEBCO web site (<http://www.gebco.net>).

**Action Required of NIOHC:**

NIOHC Members are encouraged to provide shallow water bathymetry data to the GEBCO Program as requested in IHO Circular Letter 36/2006