EMODnet Bathymetry

SBD Day, Herrsching

Schmitt Thierry (SHOM)
Knut Hartmann (EOMAP)
Benoit Loubrieu (Ifremer)
Vivi Drakopoulou (HCMR)
Sandra Aguilar, Martin Verlan (Deltares)
Dick Schaap (MARIS)
All the EMODnet HRSM consortium
A brief history of bathymetric DEM
Introduction

Generating EMODnet bathymetry

Need for SDB

Producing SDB

Integration of the SDB

Future work
EMODnet Bathymetry Consortium

Introduction
Generating EMODnet bathymetry
Need for SDB
Producing SDB
Integration of the SDB
Future work

6/13/2018
Summary: Global workflow

GLOBAL WORKFLOW
Input of a dataset in EMODnet bathymetry DTM

<table>
<thead>
<tr>
<th>Mesh size in fraction of minute of arc</th>
<th>Corresponding value in meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1852.00</td>
</tr>
<tr>
<td>4</td>
<td>463.00</td>
</tr>
<tr>
<td>16</td>
<td>115.75</td>
</tr>
<tr>
<td>64</td>
<td>28.94</td>
</tr>
<tr>
<td>256</td>
<td>7.23</td>
</tr>
<tr>
<td>1024</td>
<td>1.81</td>
</tr>
<tr>
<td>4096</td>
<td>0.45</td>
</tr>
</tbody>
</table>
www.emodnet-bathymetry.eu
Limitations in the coastal areas

EMODnet
European Marine Observation and Data Network

From Eakins et al. [2014]

Modified after Cowell and Thom [1997].
SDB data provided to EMODnet
Bathymetry by EOMAP
Sextant Catalogue service

- Satellite Derived Bathymetry South Aegean-Greece
  - Data provides bathymetric information based on Landsat 8 satellite at 15 m resolution. Data were processed by the Modular and Inversion System (MIP) by EOMAP GmbH Co.KG. MIP is designed for the physically based.

- Satellite Derived Bathymetry Crete - Greece
  - Data provides bathymetric information based on Landsat 8 satellite at 15 m resolution. Data were processed by the Modular and Inversion System (MIP) by EOMAP GmbH Co.KG. MIP is designed for the physically based.

- Satellite Derived Bathymetry Tobruk - Libya
  - Data provides bathymetric information based on Landsat 8 satellite at 30 m resolution. Data were processed by the Modular and Inversion System (MIP) by EOMAP GmbH Co.KG. MIP is designed for the physically based.

- Satellite Derived Bathymetry Peloponnesse

- Satellite Derived Bathymetry Attica, Central

Keywords:
- Bathymetry and Elevation (18)
- Lowest Astronomical Tide (18)
- EMODnet Bathymetry (18)
- cameras (18)

Contact for the resource
Years
Spain Mediterranean Coast

8 CPRD dataset for Spain Med. coast, including Ceuta and Melilla Average bathymetric data coverage down to 15m
Aegean Sea and Peloponnes

9 CPRD dataset for Greece Aegean Sea and Peloponnes. Average bathymetric data coverage down to 18m
Aegean Sea and Peloponnes

1 CPRD dataset for Libya, Tobruk area. Average bathymetric data coverage down to 20m
Scatterplot of Satellite Derived Bathymetry vs. approx. 4 million acoustic survey point datasets and 0.4 million charting points for the Spanish Mediterranean coastline, showing a coherent fit with vertical uncertainties better than ZOC category C (2 + 5% water depth).
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 687323.
Introduction
Generating EMODnet bathymetry
Need for SDB
Producing SDB
Integration of the SDB
Future work

Med east
Island of Crete

EMODnet 1/8 (2016)

Satellite Derived Bathymetric Grid, Iraklion area, SDB (2018)
Introduction

Generating EMODnet bathymetry

Need for SDB

Producing SDB

Integration of the SDB

Future work

Channel Islands
Coastline estimation

Introduction
Generating EMODnet bathymetry
Need for SDB
Producing SDB
Integration of the SDB
Future work

EMODnet
European Marine Observation and Data Network

Satellite water occurrence detection

Tidal information from Numerical Model

High waterline
90% dry
0% dry

Low waterline
10% dry
90% dry

High-res bathymetry

MSL

10% sea level
90% sea level
EMODnet
European Marine Observation and Data Network

1. Gather satellite data

2. Detect Water bodies

\[ NDWI = \frac{\rho_{\text{green}} - \rho_{\text{nir}}}{\rho_{\text{green}} + \rho_{\text{nir}}} \]

3. Relate satellite passage to water level

4. Extrapolate water bodies limits to defined tidal levels
DTM confidence estimation

Introduction
Generating EMODnet bathymetry
Need for SDB
Producing SDB
Integration of the SDB
Future work

Vertical pos system
Horizontal pos system
Error budget of Sensors composing the acquisition (incl processing)
Total Positionning Uncertainty Total Vertical Uncertainty

Age
Seabed mobility Index
Type of substrate (EMODnet Geology or other)
As found in the CDI
Sounding density (as computed during gridding process)
Purpose of survey/ respect of coverage specifications from S44

Accuracy
Temporal Representativity
Completeness

6/13/2018
<table>
<thead>
<tr>
<th>QI_horizontal</th>
<th>QI_vertical</th>
<th>QI_age (provider expresses it through)</th>
<th>Respect of a standard (abstract)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown or &gt; 500m (That is grossly equivalent to TACAN, OMEGA systems or similar)</td>
<td>0: Unknown, plummet, leadline</td>
<td>&gt; 30 y</td>
<td>Purpose of the survey unknown (historical survey with no associated information).</td>
</tr>
<tr>
<td>between 500m and 50m (That is grossly equivalent to LORAN, DECCA systems or similar)</td>
<td>1: SBES Low Frequency, SDB (similar than 2+5%d)</td>
<td>10-30 y</td>
<td>Transit and/or opportunity</td>
</tr>
<tr>
<td>between 50m and 20m (That is grossly equivalent to natural GPS systems)</td>
<td>2: MBES low frequency (lower than 100KHz) (similar than 1+2%d)</td>
<td>5y -10 y</td>
<td>Bathymetric/morphologic survey</td>
</tr>
<tr>
<td>&lt; 20m (GPS with correction) (That is grossly equivalent to aided GPS system DGPS, RTK ...)</td>
<td>3: Lidar, SBES High Frequency</td>
<td>0y – 5y</td>
<td>Hydrographic survey or compatible with hydrographic standards</td>
</tr>
<tr>
<td></td>
<td>4: MBES High frequency (higher that 100kHz)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Visit us:
www.emodnet-bathymetry.eu