Surface Current Data for Precision Navigation Applications

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Operational Forecast Systems - OFS

- NOAA operational nowcast and forecast models
- Run 24 hours per day; output every 6 hours
- Support NOAA mission goals and priorities
- Operational Forecast System - Data

- Operational Forecast System - Components
  - Hydrodynamic model predictions
  - Product dissemination
  - Quality control monitoring
Operational Forecast System – Lower Chesapeake Bay

**Model Inputs**
- Winds
- Water Levels
- Currents

**Model Outputs**
- Water Levels
- Currents
- Water Temperature
- Water Salinity

[Map of Lower Chesapeake Bay with labeled locations and symbols]
Chesapeake Bay OFS

Irregular node spacing – 78,480 pts

Water depth - meters
Chesapeake Bay – Regular Node Spacing

dx = 0.010 deg  dy = 0.010 deg
Surface Currents - Operationalize S-111 Data

Description

• Develop a service to disseminate OFS surface current data in the IHO’s S-111 format
• For use in Electronic Navigation Systems (ENC)
• S-111 data is designed for interoperability
• IHO product specifications based on S-100 Framework
• S-111 Surface Currents Product Specification adopted by IHO on February 13, 2019
# Surface Currents S-111 Metadata

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IHO Specifications</td>
<td>S-100 Edition 4.0.0</td>
</tr>
<tr>
<td></td>
<td>S-111 Edition 1.0.0</td>
</tr>
<tr>
<td>Format</td>
<td>Hierarchical Data Format 5 (HDF5)</td>
</tr>
<tr>
<td>Operational Forecast System (OFS) Parameter(s)</td>
<td>Surface Currents</td>
</tr>
<tr>
<td>Coordinate System</td>
<td>WGS 84</td>
</tr>
<tr>
<td>Frequency</td>
<td>4 times daily cycle (0, 6, 12, 18 UTC)</td>
</tr>
<tr>
<td>Time Resolution, Duration</td>
<td>Hourly out to 48 hours</td>
</tr>
<tr>
<td>Time Zone</td>
<td>UTC</td>
</tr>
<tr>
<td>Resolution</td>
<td>~500 m (regular grid)</td>
</tr>
<tr>
<td>Depth</td>
<td>4.5 m below surface</td>
</tr>
<tr>
<td>Data Coverage</td>
<td>Chesapeake Bay, VA/MD/DC (CBOFS); Delaware Bay, DE/NJ (DBOFS) (as of Dec ‘18)</td>
</tr>
<tr>
<td>Hydrodynamic Model</td>
<td>Regional Ocean Modeling System (ROMS)</td>
</tr>
</tbody>
</table>
Lower Chesapeake Bay

ENC Band: 4
Format: S-111 w/ HDF5 encoding
Grid Resolution: 0.01 deg
Parameter: Surface currents
Coordinate System: WGS 84
Dataset: 72 hours, 1 hr intervals
Time Zone: UTC
Date: 19:00 December 3\textsuperscript{rd}, 2018
Lower Chesapeake Bay

ENC Band: 4
Format: S-111 w/ HDF5 encoding
Grid Resolution: 0.01 deg
Parameter: Surface currents
Coordinate System: WGS 84
Dataset: 72 hours, 1 hr intervals
Time Zone: UTC
Date: 19:00 December 3rd, 2018
NOAA Electronic Navigation Charts (ENC)

ENC Band: 4
OFS: Chesapeake Bay, Delaware Bay, New York Harbor
Format: S-111 w/ HDF5 encoding
Grid Resolution: 0.01 deg
Parameter: Surface currents
Coordinate System: WGS 84
Dataset: 72 hours, 1 hr intervals
Time Zone: UTC
Date: 19:00 December 3rd, 2018
S-111 Grid Portrayal Example
CCOM/JHC Proposed Streamline Portrayal
Thank You

Neil Weston - Office of Coast Survey, NOAA