Evaluation of the NOAA Operational Forecast System in Delaware Bay

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Outline

• Introduction to
  • HF radar
  • NOAA PORTS
  • Delaware Bay Operational Forecast System (DBOFS)
  • US Coast Guard Ports and Waterways Safety Assessment

• Overview of HF radar measurements in Delaware Bay

• Two week evaluation of the NOAA Operational Forecast Model in Delaware Bay using the HFR measurements
Introduction to HF Radar
Delaware Bay Traffic

https://examples.pyviz.org/ship_traffic/ship_traffic.html
Ports and Waterways Safety Assessment

Waterway Risk Model

<table>
<thead>
<tr>
<th>Vessel Conditions</th>
<th>Traffic Conditions</th>
<th>Navigational Conditions</th>
<th>Waterway Conditions</th>
<th>Immediate Consequences</th>
<th>Subsequent Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shallow Draft Vessel Quality</td>
<td>Volume of Small Craft Traffic</td>
<td>Water Movement</td>
<td>Dimensions</td>
<td>Petroleum Discharge</td>
<td>Environmental</td>
</tr>
<tr>
<td>Commercial Fishing Vessel Quality</td>
<td>Traffic Mix</td>
<td>Visibility Restrictions</td>
<td>Bottom Type</td>
<td>Hazardous Materials Release</td>
<td>Aquatic Resources</td>
</tr>
<tr>
<td>Small Craft Quality</td>
<td>Congestion</td>
<td>Obstructions</td>
<td>Configuration</td>
<td>Mobility</td>
<td>Economic</td>
</tr>
</tbody>
</table>
HFR in Delaware Bay 1984

Mapping Surface Currents with CODAR


With an area resolution of about 5 kilometers selected for these maps, there is evidence of a weak gyre that forms at the mouth of the bay at slack current tide. This gyre then propagates some distance up the bay (seen in subsequent maps) at the phase velocity determined by the water depth in this area; these features tend to disintegrate due to varying depth over their spatial expanse. Although most such features repeat themselves with semi-diurnal regularity in calm conditions, CODAR shows that stiff winds cause significant departures from the norm, a factor that any successful model must include.
HFR Present Day
2021
Lewes HFR Installation
HFR Present Day 2021
DBOFS vs HFR
Time series – July 18-Aug 1, 2021
Spatial comparison

DBOFS vs HFR
Spatial comparison
Conclusions

• HFR measurements and model forecasted currents are available in Delaware Bay for use by the maritime community

• The model is underestimating the currents in the along channel direction and show no skill in the cross channel

• The HFR measurements are capturing cyclonic eddies on a daily basis that are not seen in the model
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Thank You!