BSEE
Oil Spill Preparedness Division
Response Research Branch

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“To promote safety, protect the environment and conserve resources offshore through vigorous regulatory oversight and enforcement.”
BSEE Oil Spill Preparedness Division

Overview

- BSEE’s Oil Spill Response Research Program Highlights
- Two Recent Projects
  - Remote Sensing (MARINE SCOUT - BSEE OSRR #1013)
  - Mechanical Recovery (Oil Thickness Sensor - #1078)
- Webpage Navigation
BSEE Oil Spill Preparedness Division
Oil Spill Response Research (OSRR)

Detection
Containment
Treatment
Recovery and Cleanup
Improving Methods
Advancing Technologies
Ohmsett Facility
BSEE OSRR - Remote Sensing
Enhanced Oil Spill Detection Sensors in Low-light Environments

BSEE OSRR #1013

- U.S. Army Research Development and Engineering Command (RDECOM)
- PI: Mark Walters
- Completion: April 2018

MARINE SCOUT - Mapping and Reconnaissance Imager, Night-Enhanced, for Sensing of Contaminants, Oil, and Unseen Threats
BSEE OSRR - Remote Sensing
Enhanced Oil Spill Detection Sensors in Low-light Environments
BSEE OSRR - Remote Sensing
Enhanced Oil Spill Detection Sensors in Low-light Environments

28 April 2017  2 AM

28 April 2017  7 AM

28 April 2017  11 AM

28 April 2017  6 PM
BSEE OSRR - Remote Sensing
Enhanced Oil Spill Detection Sensors in Low-light Environments

Oil Temperatures over 24-hours

Data contained in the red circles are at thermal cross over and not used
BSEE OSRR - Remote Sensing
Enhanced Oil Spill Detection Sensors in Low-light Environments

Daytime

Weather Station Outputs
- Solar Radiation (638 W/m²)
- Air Temperature (16.7°C)
- Water Temperature (15.9°C)
- Wind Speed (1.0 m/s)
- 28 April 2017 (10 AM)

Nighttime

Weather Station Outputs
- Air Temperature (12.6°C)
- Water Temperature (15.8°C)
- Wind Speed (0.7 m/s)
- Relative Humidity (99%)
- 28 April 2017 (2 AM)
BSEE OSRR - Remote Sensing
Enhanced Oil Spill Detection Sensors in Low-light Environments

User Output Screen
Output layered on Google Earth Image
BSEE OSRR – Mechanical Recovery
Development of an Oil Thickness Sensor

BSEE OSRR #1078
- American University of Beirut
- PI: Dr. Imad Elhajj
- Completion: March 2018

Sensor Prototype
Concern: Fouling Causing Erroneous Readings

- Oleophobic coatings
- Vibration mechanism
- Multiple “smart” algorithms to process data
- Protruding pins to mitigate fouling
BSEE OSRR – Mechanical Recovery
Development of an Oil Thickness Sensor

Ohmsett Tests:
• Static and dynamic dipping tests
• Drag tests and Skimmer in Waves
### BSEE OSRR – Mechanical Recovery

**Development of an Oil Thickness Sensor**

<table>
<thead>
<tr>
<th>ID</th>
<th>Start Time</th>
<th>End Time</th>
<th>Actual Thick. (mm)</th>
<th>Avg. Meas. Thick. (mm)</th>
<th>Std Dev</th>
<th>Sample Size</th>
<th>Sample Duration</th>
<th>Absolute Error (mm)</th>
<th>Note</th>
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<tbody>
<tr>
<td>1</td>
<td>09:58:28</td>
<td>10:03:33</td>
<td>25.4</td>
<td>25.8</td>
<td>5.5</td>
<td>14</td>
<td>05:05</td>
<td>0.44</td>
<td>Calm</td>
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<tr>
<td>2</td>
<td>10:11:22</td>
<td>10:16:56</td>
<td>25.4</td>
<td>3.0</td>
<td>0</td>
<td>32</td>
<td>05:34</td>
<td>-</td>
<td>Sensor dunk into water</td>
</tr>
<tr>
<td>3</td>
<td>10:31:22</td>
<td>10:43:30</td>
<td>38.1</td>
<td>34.6</td>
<td>12.8</td>
<td>69</td>
<td>12:08</td>
<td>3.5</td>
<td>Valid Measures</td>
</tr>
</tbody>
</table>
Development of an Oil Thickness Sensor

**Future Work - Phase II underway**

- Fouling remains a source of error (heavy oils and splashing)
- Use cases and operational considerations
- Enhance sensor resolution
- Address other limitations that appeared during the testing
Questions or Comments?
“To promote safety, protect the environment and conserve resources offshore through vigorous regulatory oversight and enforcement.”