NOAA |Office of Response and Restoration | Emergency Response Division,

AS ANT

Recent Research to Help Optimize Spill Responses and Assessments

Lisa DiPinto, Ph.D. Senior Scientist NOAA Office of Response and Restoration December 5, 2019

Office of Response and Restoration Organization

Department of Commerce / NOAA National Ocean Service Office of Response and Restoration





Emergency Response Division











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NOAR

Deepwater Horizon Lessons Learned Studies and Operational Tools Development (BSEE-NOAA)

Detection of Oil Thickness and Emulsion Mixtures using Remote Sensing Platforms

Controlled Experiment



Marine Validation



Methods and Implementation



https://www.bsee.gov/research-record/osrr-1079deepwater-horizon-lessons-learned-methodologyand-operational-tools-to



Partners:

EPA, NASA, USGS, USCG, WHOI, UNT, USF, Abt Consulting, Ocean Imaging, Water Mapping, Fototerra, MDA Canada, MSRC

Development and Calibration of Multispectral UAS (Ohmsett)





Offshore Application: MC20 Site, Gulf of Mexico 2017

Ocean Imaging's classification of oil thickness ranges at MC20 on November 17, 2016, integrating boat-collected data with TRACS remote sensing signatures (MC20)







From Research to Application



3-Dimensional Mapping of Dissolved Hydrocarbons and Oil Droplets (BSEE funded)

<u>REMUS 600 Development</u>

- fluorescence, back scatter, holographic imaging, camera and water sampler for comprehensive 3-d hydrocarbon mapping.
- Field trials (Santa Barbara seeps area)
- Multiple vehicles and sensors tested
- Data outputs and delivery (DIVER, ERMA)







Flume tests at UNH



In Situ Early Life Stage Bioassay: Toxicity Under an Oil Slick

- An *in-situ* exposure and effects tracking system was developed for assessing oil spills
 - Topsmelt, sheepshead larvae and mysids tested
 - Fluorometry, passive samplers, discrete water samples
 - UV light (photoenhanced toxicity)
- Testing conducted in oil seep field near Santa Barbara CA
- Paired with multi spectral UAS for surface oil characterization





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Comparing Advances in Estimating and Measuring Oil Slick Thickness

Canada Multipartner Research Initiative

- 1. Workshop (November 2019)
- Side-by-side experiments in a controlled environment (Ohmsett test facility, New Jersey)
- 1. Field testing- location to be determined



More Research Planned

Advancing Detection Capabilities for Monitoring Oil Spills in Ice Environments



Technical Research Proposal for Development of UAS and AUV Operations presented by:

Lisa DiPinto, Ph.D. Senior Scientist NOAA Office of Response and Restoration

In collaboration with

Robyn <u>Conmy,</u> Ph.D. Research Scientist US EPA National Risk Management Research Lab

Scott Pegau, Ph.D. Research Scier Prince William May 13, 2019





CRREL oil-ice testing facilities in New Hampshire. These facilities will be use during the sensor calibration phase 1.

> Field trials proposed for testing sensors for detection of oil in cold water + ice environment. Location TBD

Cook Inlet Regional Citizens Advisory Council Board Meeting

Nancy E. Kinner Coastal Response Research Center (CRRC) Center for Spills and Environmental Hazards (CSE) University of New Hampshire

December 6, 2019



Coastal Response Research Center (CRRC)

- NOAA's Office of Response and Restoration (ORR)/UNH Spill Partnership
 - Originally through CICEET in 2002
 - MOA between NOAA & UNH in 2004
 - 5 year grants (current until 2022)
- Parallel Center for Non-NOAA Funding
 - Center for Spills and Environmental Hazards (CSE)



Center for Spills and Environmental Hazards (All Other \$)

- Conduct and Oversee Basic and Applied Research and Outreach on Spill Response and Restoration
- Transform Research Results into Practice
- Serve as Hub for Oil Spill R&D
- Facilitate Interaction Among Oil Spill Community (all stakeholders)
- Educate/Train Students Who will Pursue Careers in Spill Response and Restoration



The State of the Science for Dispersant Use in

Arctic Waters

- On CRRC website
- Literature databases
- White Papers on:
 - Efficacy and Effectiveness
 - Physical Transport and Chemical Behavior
 - Degradation and Fate
 - Ecotoxicity and Sublethal Effects
 - Public Health and Food Safety
- All documents are now final/posted



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Best Practice Guidance for Coordinated State and Federal Management of Fisheries and Seafood Products Following a Spill



Post-Spill Fisheries Management

- New England region (POC: Steve Lehmann)
- Series of conference calls & webinars with State responders, NMFS, Sea Grant, FDA, USCG, and NOAA Seafood Inspection Program
- Face-to-face meeting held on Feb 27, 2019 at NOAA's regional fisheries office in Gloucester, MA
- Discussions:
 - Develop guidance for pre-impact protection strategies
 - Pre-closure options
 - Closure criteria and predictive methods
 - Stakeholder communication
 - Opening criteria and protocols and partnerships



CRRC Working Groups



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Working Groups

- Keep oil spill community aware of ongoing research on specific topics
- Meet in conjunction with Clean Gulf and IOSC Conferences:
 - SCAT Working Group
 - Dispersant Working Group
 - Submerged Oil Working Group
- Meeting notes and updates are posted on CRRC webpage



Arctic Domain Awareness Center Funded Project

- Oil Spill Modeling for Improved Response to Arctic Maritime Spills: The Path Forward
- Project Clients: US Coast Guard & NOAA
- Objective is to create a knowledge product that will detail:
 - Needs/questions for Arctic oil spill response models
 - Current state-of-the-art Arctic models
 - Assess their utility in response modeling
 - Research efforts to improve current models
- Workshop 1 at UAA Dec 3-5 2019



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Submerged Oil



- Different bottom substrates
- Different water velocities, salinities and temperatures



Coastal Response Research Center

- Three oil types
- Weathered and fresh oils



Efficacy of Snare for Submerged Oil Response

Detection



API Sunken Oil Detection and Recovery, 2016



Monitoring

NH

Coastal Response Research Center

Potential Role of Marine Oil Snow in Cook Inlet, AK

Sue Saupe, CIRCAC Jesse Ross, CRRC Kai Ziervogel, UNH

Joint Funding: CRRC and CIRCAC



Center for Spills in the Environment



Research Questions:

How could marine snow change the fate of spilled oil in Cook Inlet?

Step 1: What is the baseline particle flux and composition in Kachemak Bay?

Mineral (OMA) vs. Biological (MOS)

Step 2: What is the potential interaction of oil with marine snow?

 Lab experiments with Kachemak Bay water with and without oil

Step 3: Preliminary marine snow survey at Portlock and Albatross Banks



Thank You for Listening

Questions???

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