

Environmental Studies Program: Ongoing Studies

Study Area(s): Chukchi Sea

Administered By: Alaska OCS Region

Title: Arctic Tracer Release Experiment (ARCTREX):
Applications for Mapping Spilled Oil in Arctic Waters
(AK-12-03b)

BOEM Information Need(s) to be Addressed: The results from this study could inform BOEM Oil-Spill Risk Analysis (OSRA) and oil-spill fate modeling efforts, and may improve detection and cleanup operations in the event of a large oil spill. Outputs could be used to verify oil-spill contingency plans. Results will support environmental assessments and decisions associated with exploration plans. The BOEM/BSEE analysts and decision-makers may use the results to improve NEPA analyses and documentation for any future exploration and development activities.

Total BOEM Cost: \$1,249,977
plus Joint Funding

Period of Performance: FY 2013-2018

Conducting Organization: University of Alaska Fairbanks

Principal Investigator(s): Dr. Peter Winsor

BOEM Contact: [Warren Horowitz](#)

Description:

Background: There is a need in the Arctic OCS to test, develop, and implement the observational platforms, mapping software, and oil-spill models that could track and assess the fate of spilled hydrocarbons. This study will field test environmental response and mapping software in cooperation with NOAA's Office of Spill Response and Restoration, and other parties who would be willing to share resources and incorporate real-time observational data into this tracking and mapping software system. We will develop and test the instrumentation for AUV gliders and other observational technologies that can map the surface and subsurface dispersion of a dye release. The BOEM will jointly work with other interested parties to field test the capability of the environmental response and mapping software to track a planned release of inert dye within the Chukchi Sea. Protocols will be developed and tested over multiple field experiments to assess applications for tracking a potential pollutant release in the OCS during the open water season.

Objectives:

- Develop a better understanding of small scale transport processes important to fate and effects modeling used in oil impact analysis.
- Assess the effectiveness of HF Radar surface current mapping system and drogued drifters for providing near-surface current input data to oil-spill models.

- Develop, test, and deploy instrumentation for Autonomous Underwater Vehicles (AUV) that can be customized for use in the Arctic to detect the spatial and temporal locations of subsurface dye plumes.
- Conduct at least two field tests of the dispersal and tracking of a non-toxic inert dye off the Chukchi coast.
- Track the dispersed dye plume by incorporating input from the AUVs and other real time data collection sensors in the Chukchi Sea (e.g., surface currents from HF Radar, drifters, modeled wind fields, data from meteorological buoys and other offshore instruments) to assess the fate and transport of the dye plume.
- Develop algorithms quantifying small scale transport processes based on measurable oceanographic and meteorological data (i.e., advection, Langmuir circulation, wind drift, vertical and horizontal dispersion coefficients, etc.)

Methods: This study will perform targeted dye release experiments at both the surface and bottom of the Northeast Chukchi Sea to examine applications for mapping spilled oil in Arctic waters. These experiments are designed to test available observational technologies and their capability to map a dye plume both temporally and spatially (simulating an oil spill) and to potentially deliver real time data to response agencies, including data for ingestion into numerical oil spill trajectory models. Two planned field experiments will be conducted during the August-September time frame, in 2014 and 2015. The research team will use the same suite of instruments currently used in the Chukchi Sea on other projects (CTDs, fluorometers, gliders and towed vehicles). Using large dynamic-range fluorometers, the research team will undertake a field experiment to map a dye plume and its evolution in time and space over a 3-6 day period over two field seasons and multiple dye injections. Part of the planned activities includes evaluating the effectiveness of instruments to track the released dye under diverse environmental conditions. The team will coordinate our field effort with NOAA's Environmental Response Management Application ERMA (Arctic ERMA) and the Bureau of Environmental Enforcement (BSEE), and work towards real time data ingestion into NOAA's oil-spill response system. All field work has been completed and final data analysis is being conducted.

Current Status: Completed

Final Report Due: January 2018

Publications Completed: None

Affiliated WWW Sites: <http://www.boem.gov/akstudies/>
<http://www.ims.uaf.edu/artlab/projects/ARCTREX/>
<https://marinecadastre.gov/epis/#/search/study/26872>

Revised Date: January 30, 2018