**BOEM ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES**

**BOEM OCS Region:** Gulf of Mexico

**Title:** Remote Sensing Assessment of Surface Oil Transport and Fate during Spills in the Gulf of Mexico (GM-12-02)

**Planning Area:** Gulfwide

**Total Cost:** $800,000 **Period of Performance:** FY 2013-2015

**Conducting Organization:** Florida State University

**BOEM Contact:** Dr. Rebecca Green

**Description:**

Background: The Bureau of Ocean Energy Management (BOEM) invests in ocean research through its Environmental Studies Program to provide science in support of management decisions. An objective of the bureau's Oil Spill Modeling Program and physical oceanography studies is to conduct research that will improve estimates of oil-spill transport, fate, and impacts to the environment. Several studies have previously been funded to improve understanding of interactions between spill transport and physical forcing mechanisms. With relevance to surface spill movements, BOEM and its predecessors deployed oil-spill-simulating drifters in the Gulf of Mexico in the late 1990's as nonpolluting oil spill proxies to compare their movements against results from the Oil Spill Risk Analysis (OSRA) model. Such comparisons have helped test parameterizations of spill velocity based on surface ocean currents and an empirical wind-induced drift. With regards to recent events, a wealth of remote sensing, overflight, and in situ measurements have been collected in recent years during spill events in the Gulf of Mexico. It is important that BOEM learns from these observations, in conjunction with physical forcing fields, to more precisely quantify wind and ocean current forcing on oil spill movement.

Objectives: The purpose of this 3-year study is to develop a better understanding of the movement, properties, and fate of surface oil from past spills in the Gulf of Mexico. Because the physical and chemical processes affecting oil movement can be unique to each spill, this study will address several historical spills. This study will elucidate the most likely mechanisms responsible for oil movement in surface waters through developing and applying remote sensing products and an oil-spill transport and weathering model.

Methods: The objectives of this study will be met through utilization of remote sensing products which describe the location and characteristics of surface oil during spill events. The first task will be to further develop satellite-based algorithms for estimating the extent and properties of the oil, including thickness and type (e.g., oil slick, thinner oil sheen, and emulsified oil). Existing in situ measurements of the oil collected during the spills will be critical for ground-truthing the remote sensing algorithms. The second task

will be application of the satellite-based algorithms to determining a time series of oil extent and properties through the duration of several oil spills. The analysis of several spills should help elucidate the mechanisms unique to each event in determining oil movement, as well as those mechanisms which are similar between events. The third task will be comparison of image products to various physical oceanographic fields (e.g., SSH, SST, winds, and currents) to determine the primary physical mechanisms responsible for oil transport. This will include determination of the relative contributions of spreading, advection by currents, advection by winds, turbulent mixing, and diffusion. Quantification will be made of the relationship between ocean material boundaries and spill movement. Consideration will also be given to weathering processes which attenuate the oil with distance from the spill site.

Products: Synthesis Reports, Datasets, Peer Reviewed Publications, and Conference Presentations

Importance to BOEM: This study will assess the movement, properties, and fate of surface oil from spills using remote sensing products and an oil-spill transport and weathering model. The study will provide information on the primary physical mechanisms that have controlled the transport of spilled oil during past spill events (e.g., advection, wind forcing, flow boundaries, etc.) for use in NEPA documents.

**Current Status:** This study was recently awarded.

**Final Report Due:** August 2015

**Publications:** none

**Affiliated WWW Sites:** none

**Revised date:** August 22, 2012

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