

BOEM ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

BOEM OCS Region: [Gulf of Mexico](#)

Title: Simulation Modeling of Ocean Circulation and Oil Spills in the Gulf of Mexico (GM-11-02)

Planning Area: Gulfwide

Total Cost: \$989,361

Period of Performance: FY 2011-2015

Conducting Organization: Applied Science Associates, Inc.

BOEM Contact: [Dr. Rebecca Green](#)

Description:

Background: The Department of Interior (DOI), specifically the Bureau of Ocean Energy Management (BOEM), invests in ocean research through the Environmental Studies Program to provide science in support of management decisions. An objective of the bureau's Oil Spill Modeling Program is to conduct research that will improve its estimates of oil-spill transport, fate, and impacts to the environment. To this end, numerous studies have previously been funded in the Gulf of Mexico to improve the understanding of the physical oceanography, oil-spill fates, and ecological impact processes in the region. Recent deepwater events in the Gulf of Mexico created a need for modeling efforts to simulate plume behavior in both surface and subsurface waters and to perform a variety of scenario runs to meet BOEM's various research and management objectives. It is essential for BOEM to simulate deep oil spills and their environmental impacts, so that it can fully understand what has happened in the past, learn from those events, and have better risk assessment and oil spill contingency plans in the future.

Objectives: The objective of this project is to develop and apply an integrated oil spill model that incorporates many of the processes which are unique to deep oil spills, with the ultimate goal of accurately simulating oil plume behavior at different depths in the water column. This modeling will incorporate the various processes responsible for oil transport and fate. In addition, model results will provide a variety of scenario runs exploring a range of outcomes from deep oil spills. An important aspect of the intended work will be comparison between model results and oil observations.

Methods: The objectives of this study will be met through development and application of an integrated oil spill model which simulates oil plume behavior as accurately as possible by incorporating the various environmental and chemical elements unique to deep spills. The study will develop an oil spill model, using an existing 3D ocean circulation model integrated into a 3D particles and concentrations model, which simulates oil plume transport and fate in the surface, sub-surface water column, and deposited in sediments and along shorelines. This modeling will include development of

a new predictive blowout model. Model parameterization will incorporate oil attenuation and weathering processes, such as advection and dispersion, evaporation, settling, and degradation in water and sediments. An important component of the study will be validation of the model with actual observations of plume transport and oil concentrations, including data from airplane overflights, satellite imagery, and water and sediment chemistry measurements. The integrated model will be applied to a series of scenario runs, which will include, for example, changes in the total volume of oil released; the amount of surface and subsea dispersant applied, and spill location.

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

Importance to BOEM: This study will develop, validate, and implement an integrated oil spill model which accurately simulates oil plume movement and fates in surface and subsurface waters of the Gulf of Mexico. Scenario runs will be conducted to inform BOEM risk assessment and oil spill contingency planning, as well as NEPA documents, on the range of possible spill outcomes.

Current Status: This study was recently awarded.

Final Report Due: August 2015

Publications: none

Affiliated WWW Sites: none

Revised date: February 2012

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