BOEM ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

BOEM OCS Region:	Gulf of Mexico
Planning Area:	Gulfwide
Title:	Lagrangian Study of the Deep Circulation in the Gulf of Mexico (GM-10-03)

Total Cost: $4,696,503 **Period of Performance:** FY 2010-2015

Conducting Organization:	Leidos
BOEM Contact:	Dr. Alexis Lugo-Fernández

Description:

Background: During the recently completed MMS study of deepwater current near the Mississippi Delta, deep drifters were released and tracked acoustically for nearly six months, about half of the time intended due to manufacturing problems of the sound sources. This short database produced tantalizing observations. Some include, deep circulation of the deep northern Gulf consists of a western and eastern cell divided about 90°W; other tracks hardly showed any net movement; while others locked into an isobath and move along it and some even reach the Campeche Bay. However, the short observing period and geographically limited releases do not allowed more broad and robust conclusions. In order to secure robust results, the need for a basin-wide release of submerged drifters coupled with profiling drifters are needed over a longer time frame and releases at several places within the Gulf basin seem warranted. Thus, the propose study was conceived to fill this void.

Objectives: The overarching goal of this study is to increase our knowledge of the deep circulation of the Gulf of Mexico through analysis of observations of deepwater tracked drifters. Specific objectives are:

- To deploy submerge and profiling drifters over three years inside the Gulf Mexico;
- To analyzed these data to produce maps of currents in the deep waters of the Gulf;
- To estimate Lagrangian statistics of these current fields such as length and temporal scales;
- To make estimates of particle horizontal dispersion and explore the feasibility of estimating vertical dispersion through deployment methodologies in the deep waters to help understand dispersion of pollutants and biological material; and
- To provide information for BOEM to fulfill its regulatory mission and comply with NEPA requirements.

Methods: This study will employed submerged drifters that can be tracked using sound from several active sources placed strategically inside the Gulf of Mexico. The

submerged drifters will remain underwater for a period of 12 months; afterward they surface and transmit via satellite their data. Immediately the Gulf will be re-seeded with more drifters and the entire cycle will be repeated three consecutive years. The remaining time will be devoted to QA/QC, analyses, and report preparation. We should explore releasing profiling drifters along to detect the T-S distribution during the study. Because the timing and duration of this study, it is envisioned that some overlapping will occur with the Loop Current Dynamics Study in the eastern Gulf of Mexico.

Products: Synthesis Reports, Datasets, and Peer Reviewed Publications

Importance to BOEM: The results of the study will provide map(s) of deep currents that will help with the assessment of accidental pollutant releases, and shed light on dispersal of larvae. These improved maps of currents will be used by BOEM and Industry to prepare for and avoid high currents, make better biological assessments for our regulatory documents, and increase our understanding of the deep circulation and its variability. Finally, these current maps could be used by archeologist to help during investigations of shipwrecks in the deep Gulf.

Current Status: The field work phase will end by July 2015. The available data is undergoing QA/QC and some preliminary analyses. Because of technical problems with buoys, the period of performance of this study will be needed to be extended by another 12 months to complete the final report.

Final Report Due:	September 2015
Publications:	none
Affiliated WWW Sites:	none
Revised date:	January 2015
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