

BOEM ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

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

Title: Effects of Loop Current and Loop Current Eddies - Analysis Using the Real-time MMS ADCPs from Oil Platforms (GM-92-42-127)

Planning Area: Gulfwide

Total Cost: \$169,412

Period of Performance: FY 2007 – 2011

Conducting Organization: [Coastal Marine Institute, Louisiana State University](#)

BOEM Contact: [Dr. Alexis Lugo-Fernández](#)

Description:

Background: The Minerals Management Service (MMS) issued a Notice to Lessees (NTL) in April 2005, requiring oil companies operating on the Gulf of Mexico OCS region to monitor and report real time velocity profiles using Acoustic Doppler Current Profilers (ADCPs) based on oil platforms. Dozens of ADCPs are collecting data at 20-30 minute intervals at the same time, covering areas of the outer continental shelf and slopes with total water depth between 400 and 2400 m (average 1220 m). The availability of these current velocity data in the deep water opens a great opportunity for the study of the three dimensional flow structures in the northern Gulf of Mexico in waters of interest to BOEM over the outer continental shelf and slope area. For the first time in history, we will be able to use dozens of ADCPs in deep water at the same time to "see" the inside of the ocean with a synoptic large picture (constructed by these current profilers) as the ocean moves under the influence of different mechanisms such as the Loop Current, Loop Current Eddies, inertial motion, frontal instability, filaments, internal soliton, internal waves, wind driven motion, geostrophic motion, and weather induced motion, to name a few.

Objectives: A main objective of the present study is to determine the three dimensional characteristics of the deepwater flow in the northern Gulf of Mexico, where dozens of ADCPs are based on oil platforms. This will be accomplished by means of a systematic analysis of current data. Another objective is to determine the mechanisms that drive this flow field. The analysis will be conducted using all data available. In situ data will be analyzed in light of the satellite observations of the Loop Current, Loop Current eddies, sea surface temperature, and sea surface height.

Methods: The project will consist of the following tasks – (1) information management and QA/QC of data, (2) development of algorithms for the analysis of ADCP velocity profile time series gathered in response to NTL 2005-G05, and subsequently reported to the NOAA's NDBC web site at http://www.ndbc.noaa.gov/maps/ADCP_WestGulf.shtml; (3) analysis of the real time ADCP data using the above mentioned algorithms and the subsequent implementation as new data continue to be collected, and compilation of the

results; (4) analysis of remote sensing data; and (5) synthesis of the results by evaluations of the ADCP data results and the remote sensing results. Data analysis will be performed in both time and frequency domains, including techniques such as power spectral analysis, Fourier analysis, harmonic-statistic analysis, and correlation analysis.

Products: Deliverables from this study include a final report, digital data files, quarterly status letters, papers to be submitted to peer-reviewed journals, and technical summary.

Importance to BOEM: Energetic currents may interrupt oil production. Knowledge about energetic subsurface currents can also be important for trajectories of oil spills, including spills from the ocean floor. The proposed study is aimed at a better understanding of current dynamics using available real time data from multiple ADCPs with potential practical applications. Researchers will analyze and synthesize existing data and information, improve the application and distribution of this information obtained from many sources, and through data analysis they will provide new information about currents in the northern Gulf of Mexico.

Current Status: The draft report is under preparation to start review.

Final Report Due: February 2011

Publications: None

Affiliated WWW Sites: <http://cmi.lsu.edu/>
http://www.ndbc.noaa.gov/maps/ADCP_WestGulf.shtml

Revised date: December 2011

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