MMS Technical Announcement

U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region

Technical Announcement

May 2004

Contact: Debra Winbush
(504) 736-2597
:
Caryl Fagot
(504) 736-2590

Cross-Shelf Exchange Processes and the Deepwater Circulation of the Gulf of Mexico: Dynamical Effects of Submarine Canyons and Interactions of Loop Current Eddies with Topography, Final Report

OCS Study MMS 2004-017

The Minerals Management Service (MMS), Gulf of Mexico OCS Region, announces the availability of a new study report, *Cross-Shelf Exchange Processes and the Deepwater Circulation of the Gulf of Mexico: Dynamical Effects of Submarine Canyons and Interactions of Loop Current Eddies with Topography, Final Report*.

This report contains results of a 4-year, process-oriented numerical modeling study focused on investigating the interaction of deep ocean circulation features in the Gulf of Mexico, e.g., Loop Current eddies, with continental shelf and slope. Loop Current eddy interactions with topography were studied in four regions: the central Gulf of Mexico, the northern Gulf of Mexico, the northeast corner of the Gulf of Mexico, and the western Gulf of Mexico. Several new dynamical mechanisms controlling the interactions of Loop Current eddies with topography were identified, and other more familiar mechanisms were clarified. Simulations and investigations of physical processes within, and in the vicinity of, DeSoto Canyon were based on three conceptual models of DeSoto Canyon circulation derived from observational data collected during the DeSoto Canyon Eddy Intrusion Study (1997-1999).

It was demonstrated that deep eddies can form during Loop Current eddy interaction with the western shelf particularly in the region around 25°W. The deep eddies are characterized by relatively strong currents (up to 20 cm/s) and large size (200-300 km in diameter), and have significant impact on the deep local environment. Deep eddies were also shown to affect significantly the evolution of Loop Current eddies interacting with the western shelf. It was also demonstrated that Loop Current eddies interacting with a thermocline-penetrating shelf can form small to intermediate-scale cyclones as a result of water advection from the shelf. The cyclones generated by this process can reach considerable strength depending upon the exact shape of the bathymetry and the motion of the Loop Current eddy. The intermediate layer, i.e., the density layer defined with moderate to weak stratification extending from approximately 400 to 1,200 meters, was found to play a central role in the interaction of Loop Current eddies with topography.

This report is available only in compact disc format. The discs are available from the Minerals Management Service, Gulf of Mexico OCS Region, at a charge of $15.00 by referencing OCS Study MMS 2004-017. The report may be ordered through the Minerals Management Service's on-line ordering system at **http://www.gomr.mms.gov/WebStore/front.asp**. You will be able to obtain this report also from the National Technical Information Service in the near future. Here are the addresses. You may also inspect copies at selected Federal Depository Libraries.

Minerals Management Service
Gulf of Mexico OCS Region
Public Information Office (MS 5034)
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394
Telephone requests may be placed at
(504) 736-2519 or 1-800-200-GULF
or FAX: (504) 736-2620

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161
(703) 487-4650 or FAX: (703) 321-8547
Rush Orders: 1-800-336-4700

The Minerals Management Service is the federal agency in the U.S. Department of the Interior that manages the nation's oil, natural gas, and other mineral resources on the Outer Continental Shelf in Federal offshore waters. The agency also collects, accounts for, and disburses mineral revenues from Federal and American Indian lands. MMS disbursed more than $8 billion in FY 2003 and more than $135 billion since the agency was created in 1982. Nearly $1 billion from those revenues go into the Land and Water Conservation Fund annually for the acquisition and development of state and Federal park and recreation lands.

MMS Main Website: **www.mms.gov**
Gulf of Mexico Website: **www.gomr.mms.gov**

Return to Technical Announcements