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## **Life and Times of Eddy Zorro: A Review of the 2007 Gulf of Mexico Loop Current Activity**

P.D. Coholan, J.W. Feeney, S.P. Anderson, Horizon Marine, Inc.

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### **Abstract**

The Loop Current and its associated anticyclonic eddies have been familiar impediments to deepwater operations in the Gulf of Mexico. At the start of 2007, the Loop Current was located well south of deepwater lease areas and all was quiet across the northern Gulf of Mexico. In March of 2007, the Loop Current advanced rapidly north of 28°00'N, engulfing most of Lloyd Ridge and entering into southern DeSoto Canyon. In early April, a new Loop Current Eddy (LCE) named "Zorro" was shed. Eddy Zorro exhibited maximum currents in excess of 4 knots and remained in the northern Gulf for over five months. It impacted operations in Mississippi Canyon, Atwater Valley, Green Canyon, DeSoto Canyon, Ewing Bank, and Lloyd Ridge. In early June, Eddy Zorro pushed further north than any previous Loop Current event observed in the history of the Eddy Watch program. It extended north to 29°15'N, covered Viosca Knoll, and even reached into the South Pass lease area. Eddy Zorro's death was unusual as well as it was completely absorbed by the Loop Current instead of assuming the traditional southwesterly migration into the western Gulf.

### **Introduction**

For over six months in 2007, the Loop Current and Eddy Zorro complicated offshore drilling and construction activities in the central Gulf of Mexico. This major anticyclone (warm core ring) was unique in many respects. While forming from the Loop Current, it advanced north across active lease blocks at a rate nearly triple the typical progression rate of eddies observed over the past several decades. Zorro also extended farther north than any previously observed eddy, impacting shallow shelf operations in South Pass off the Mississippi Delta. Zorro exhibited maximum currents as high as 4.3 knots even after separating from the Loop Current. The eddy separated and reattached to the Loop Current three times over a period of nearly four months. One of the attachments was unique as a band of water extended from around the Loop's eastern front, snagging the eddy. Zorro's center of circulation migrated more slowly and over the shortest distance than any eddy previously observed. It was also the only major eddy known to disappear and be totally absorbed by the Loop Current.

The Loop Current, anticyclonic (warm core) eddies like Eddy Zorro, and cyclonic (cold core) eddies are common phenomena in the Gulf of Mexico. When these features enter areas of active offshore exploration, installation, and production, they often have a significant impact on operations. Three to four knot currents associated with the Loop and eddies can shift rigs off position, cause structural bending, stress and excessive riser angle, and inflict other costly damage. Anchoring operations, anchor cable tension, and load distribution can be impaired. Diving, ROV operations, and pipelaying are often impossible. Downtime can last for weeks as currents interfere with sensitive operations.

This paper will describe Zorro's rapid northerly extension into areas never before impacted by strong currents, the numerous separations and reattachments, intensity, the atypical migration, its impact on operations, and the ultimate absorption and recession from active lease areas.

### **Data Sources and Methodology**

The primary source of data regarding currents in the Gulf of Mexico is the Far Horizon Drifter (FHD), an air-deployable satellite transmitter platform. Fourteen of these were strategically deployed in and around the Loop Current as Zorro developed, 62 were deployed in and around Eddy Zorro between 02 April and 17 August, and 6 more were placed in and along the perimeter of the Loop Current the end of August. Drogued to remain with the current and having negligible