How Multibeam Data Complement and Improve Structural 2D Seismic Interpretation: Examples from the Mexican Gulf of Mexico

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EXTENDED ABSTRACT

Recently acquired broadband long-offset 2D seismic data in the Mexican Gulf of Mexico provide a high-quality image of complex geological structures, but interpreters still experience difficulties understanding the geometry and extent of some of these structures. Multibeam data is conventionally used to identify risk at the seabed prior to installing subsea infrastructure (Bastia et al., 2011). Here we demonstrate that the integration of multibeam data into the interpretation workflow adds significant value to the interpretation results.

The Gigante multibeam survey (approx. 600,000 km^2 covers the Mexican Gulf of Mexico and extends into parts of the U.S. Gulf of Mexico. The data, acquired in January-December 2016, provide a high-quality image of the geomorphic expressions at seabed of the various geological domains that characterize the Mexican Gulf of Mexico. It reveals a dynamic seafloor environment with spectacular structural and geomorphic detail including mass-transport complexes, salt knolls, minibasins, fault escarpments, gas and fluid escape features, and submarine channeling and slumping.

Digital elevation model (DEM) attributes (Fig. 1), including slope, aspect, plan, and profile curvatures, derived from the multibeam bathymetry data can be used to construct a workflow to automatically extract the shape and extent of these geomorphic expressions (Andrews et al., 2010), and classify the morphology of the derived features. The resultant maps give an accurate representation of the boundaries of, and trends within, present-day geological domains and give information about fault, fold, and salt body shape (Fig. 2). Examples will be presented as case studies to demonstrate how the integration of multibeam data with 2D seismic data can be used to more reliably correlate complex structures across 2D seismic lines.

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