New Interpretation of the Depositional Systems of the San Pedro Basin Based on New Seismic Data, Southern Dominican Republic Offshore Margin

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Abstract

The San Pedro Basin (SPB) is an E-W-trending bathymetric depression classically interpreted as a "forearc type basin", although it is located in the retroarc compressive region of the eastern Greater Antilles far southwards from the true subduction along the Hispaniola and Puerto Rico trenches. This basin shows a maximum sediment thickness of 3 sTWT having little deformation although it is formed in the rear of an active imbricate back-thrust system, known as the Muertos Thrust Belt. This basin has a smooth seafloor morphology occupying 6000 km^2 and having an average water depth of 1400 m. The SPB is located close to a confirmed onshore petroleum systems, but several attempts of onshore-offshore stratigraphic correlations showed discrepancies.

New 2D multi-channel data were acquired in the SPB aboard the R/V "Sarmiento de Gamboa" as a part of the Spanish Research Project NORCARIBE in November-December of 2013. The new data, having improved resolution and penetration, together with old reprocessed seismic profiles allowed us to carry out a detailed analysis of the seismic stratigraphy.

A seismic facies analysis allowed us to propose a new infill evolution related to the main tectonic events at the source areas, associated to the up-lifting stages of the Central and Oriental cordilleras of Hispaniola that started in the Middle-Upper Eocene. The infill of the basin has been divided into main sequences that are related to depositional systems: (1) Upper Cretaceous deep-water pelagic sedimentation; (2) Middle-Upper Eocene basin floor fan systems; and (3) Upper Eocene-to-Present turbidite system with channels embedded into fines deposits. Our results suggest an older age for the SBP that are in agreement with the geological studies carried out in the San Cristobal basin located to west of the SPB and considered for some authors as the lateral continuation.