

Trans-Andean Mega-regional Seismic Reflection Line Extending from the Caribbean Coast to Cordillera Oriental of Colombia: Implications for Hydrocarbon Exploration

Vargas Jimenez, Carlos A.¹; Mann, Paul¹; Gomez, Clemencia²; Briceño, Luis A.²; Rey, Carlos² (1) Institute for Geophysics, University of Texas, Austin, TX. (2) Subdirección Técnica, Agencia Nacional de Hidrocarburos, Bogotá, Colombia.

During 2007-8, the Colombian government working through the National Hydrocarbons Agency (ANH) collected a 383 km-long, triaxial high-resolution seismic reflection line using active sources that were recorded to depths of 20 seconds two-way travel time. Several types of supporting data were also collected along the same transect that included surface geology, gravity, magnetics, and geochemistry of hydrocarbons. The purpose of the study was to constrain 1) the deep structure and stratigraphy of the Sinu-San Jacinto belt - the onland late Cretaceous accretionary prism; 2) the tectonic boundary separating these accreted oceanic rocks from the South American continental margin (Romeral fault zone); 3) the Eocene-Oligocene unconformity of the Lower (LMB) and Middle Magdalena basins (MMB), and 4) the tectonic boundary between the Cordillera Oriental and the MMB. Features best imaged on the line include the unconformity and overlying sedimentary fill of the San Jorge and Middle Magdalena basins. Both gently folded, synclinal basins have been shortened in the east-west direction by much less than estimates of 110-150 km based on previous balanced cross sections. Geochemistry of hydrocarbons in the San Jorge and Middle Magdalena basins show that all source rocks are contained within these gently deformed synclines. Sub-vertical, active strike-slip faults of northern extension of the La Salina fault are seen crossing the eastern part of the line in the MMB. Seismic penetration into the sub-unconformity section was disappointing but more recent seismic processing shows the general eastward dip of thrust-imbricated strata of the Sinu-San Jacinto belt. In this area, the Eocene-Oligocene unconformity at the base of the western margin of the LMB may act as a trap for hydrocarbons for known source rocks of the Sinu-San Jacinto belt. The boundary between the Cordillera Oriental and MMB is defined by the Cambao-La Salina thrust system that dips 25 degrees to the east beneath the Cordillera Oriental.