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The Peruvian Marañón Basin Hydrocarbon Potential. Petroleum Systems Evaluation Based on New Chronostratigraphy and Sourcing Framework

The Marañón basin forms the southernmost extension of a politically divided large foreland basin (150,000 km²) that extends from Colombia to Peru known as the Putumayo - Oriente -- Marañon basin. The Marañón basin is the least prolific of the three with a EUR of 1BBO, possibly as a result of poorly developed exploration concepts. During the last 30 years the exploration activity was concentrated in the eastern basin flank along a narrow NW-SE belt following a single exploratory concept inherited from the adjacent Oriente basin that involves the Chonta -- Vivian clastic reservoirs charged by a postulated Upper Cretaceous source (Chonta shales) in pre Eocene paleostructures. Exploration activity was gradually abandoned as this exploratory play was exhausted, resulting in only 13 exploratory wells drilled on the last 10 years. The basin holds an impressive record of 42% chance of success for a total of 105 exploratory wells. In order to reexamine the remaining basin potential an extensive regional study was completed focusing on the three critical factors: a) sequence stratigraphic framework; b) source rock intervals and complex oil families and c) regional seal extension and migration pathways. As a result of the improved understanding of these elements two efficient petroleum systems were identified and successfully tied to the existing oil accumulations controlled by seal extension and source rock quality. A detailed analysis of geochemical well studies indicated the Pucara shales as being the primary source rock for the basin, with minor contributions from the Raya (Albian) shales. A 2D basin modeling was completed along an east-west section from the kitchen area to the producing fields trend, supporting an efficient Pucara expulsion and migration timing versus an inefficient Chonta system.