

A Reinterpretation of the Misoa Facies Types: Implications of a New Depositional Model, Maracaibo Basin, Venezuela

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The Eocene-age Misoa Formation is a prolific producer of hydrocarbons in the Maracaibo Basin, Venezuela. To understand the depositional origin of the reservoirs and predict their distribution and continuity, it is important to undertake a detailed sedimentological interpretation of the available cores. One of the first steps performed in any core description is the facies identification, which is defined on the basis of its distinctive lithologic features, including composition, grain size, bedding characteristics and sedimentary structures. The facies scheme developed for the Misoa Formation involved tractive structures originated from sediment-free diluted flows associated to a fluvio-deltaic system. Recently, in a revision of the facies scheme, the Misoa Formation has been reinterpreted as being deposited from sustained fluvial-derived hyperpycnal flows. The facies types consist principally of thick ungraded sandstone beds, which appear massive or displaying parallel lamination, climbing ripples, and anisotropic hummocky cross stratification. These structures suggest a deposition by traction plus fall-out processes from an overpassing sand-laden sustained underflow. The alternations and gradual recurrence of these structures evidence fluctuations in flow velocity and concentration that characterize a quasi-steady hyperpycnal flow. In recent years, hyperpycnal flows have received increasing attention as an efficient mechanism to transport considerable volumes of sand into the basin. The main implication in changing the fluvio-deltaic sedimentological model for the Misoa Formation into a hyperpycnal system lies in the consequent changes in the lateral extension, geometries, orientation, and continuity of their associated reservoir sands. Improved modeling is crucial for planning secondary recovery projects.