

Outcrop/Subsurface Geological Characterization of La Luna Formation as Gas Shale in the Northwest Lago de Maracaibo Basin and North Andean Flank, Venezuela

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Abstract

The upper Cretaceous La Luna Formation is of crucial importance in the petroleum geology of northern South America, especially in Venezuela and Colombia. The largest in situ oil accumulation in the world (1.5 trillion barrels) is located in eastern Venezuela associated with the La Luna source rock. The La Luna is now being considered an un-conventional shale prospect (PDVSA-2012). This preliminary study encompasses stratigraphic and geochemical characterization of La Luna Formation from seven outcrops and one 345ft. core along the North Andean flank and the northwest of Lago de Maracaibo Basin. TOC content from the core varies from 0.22 to 9.13 wt% (average 4.01 wt. %). Rock-Eval pyrolysis results highlighted type I and type II kerogen, a “Good-to-Excellent” oil potential generation and a maturity indicator suggesting a greater likelihood of oil than gas. The Delta Log R method (Passey, 1990) of TOC estimation, showed a good agreement with the Rock-Eval results. Eight facies were defined in the La Luna core. From bottom to top: dark gray, laminated mudstone; calcareous shales; Volcanic Ash; Laminated mudstone with lime-stone concretions; Laminated mudstone interbedded with black chert filled with calcite veins; Brown mudstone with strong petroleum odor; Calcareous laminated black mud-stone interbedded with fossiliferous wackstone; Brown/ Grey wackstone with formation of authigenic glauconite and Pyrite. Planktonic foraminifera are present in the upper part of the interval. These results serve as a baseline for current study of the La Luna Formation in Venezuela.