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Sedimentology and depositional evolution of Juin 4 Block in Orinoco heavy oil belt, Venezuela

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Based on core information, this paper studied the sedimentary features and facies evolution of Paleogene Merecure and Neogene Oficina formations in the Juin 4 block at the center of Orinoco heavy oil belt. The formation is controlled by the tectonic movement of Eastern Venezuelan Basin. The overall succession consists of a fluvial-delta depositional system related to an increase accommodation and a rising sea level. A fluvial-delta system gradually evolved into a tide-dominated lower delta plain and is overlain by a subtidal zone. The Merecure Formation developed in an upper delta plain and contains shallow, sandy braided river deposits close to the sediment supply. This formation includes braided channel fill, channel bar, and over-bank microfacies. The lower Oficina Formation records a tide-influenced upper delta plain which includes meandering channel, levee, crevasse splay, and over-bank microfacies. Overlying deltaic facies consist of mouth bar-platform facies. With the continuously rising sea level, delta-platform deposits give way to widespread subtidal facies.

Based on core analysis of the study area combined with fossils information, 12 lithofacies are identified; laminated shale, argillaceous siltstone, thick (shale lump-containing) sandstone, thick sandstone with shale laminations, moderately thick sand-shale, thin-bedded sand-shale, lenticular-convolute bedded sandstone, massive sandstone, trough cross-bedded sandstone, horizontally bedded shale, boulder clay-granule-conglomerate and bioturbated sandstone.

Lithofacies associations record changing sedimentary environments that determined the development of sand bodies at different times. In Merecure Formation, thick sand bodies are superimposed and extend for long distances. In Oficina Formation (D~C), sand bodies are developed only locally whereas in the Oficina Formation (B~A) sand bodies are thin and are isolated within thicker shale intervals.

Key words: lithofacies; microfacies; evolution; Juin 4 Block; Orinoco heavy oil belt.

