SEDIMENTOLOGY AND STRATIGRAPHIC STACKING PATTERNS OF THE SISI-NUBI FIELD PRODUCING INTERVAL, LOWER KUTEI BASIN, EAST KALIMANTAN, INDONESIA

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ABSTRACT

Sisi-Nubi field is located in the external axis in the shallow marine environment in the Mahakam area. Many different orders of stratigraphic stacking pattern are recognized in the Sisi-Nubi Producing interval (Upper Miocene).

Shallow marine parasequence, the smallest stratigraphic building block (5th order, 15-40 m thick) is dominated by non reservoir marine shales associated with shoreface sand bars. Transgressive carbonates often cap their top.

Many shallow marine parasequences are vertically stacked in 3rd order Genetic Sequences characterized by a regressive pattern followed by a transgressive pattern.

Thick fluvial sand accumulations often cut through the section of Sisi-Nubi Producing interval. They represent frequent and very rapid sea level falls that bring the fluvial channels on top of shoreface deposits during forced regressions.

The whole Sisi-Nubi Producing interval represents a second order Genetic Sequence. The base of sequence is the MF 7 Ma marker (Upper Miocene) and the top of the sequence is the MF 5 Ma marker (Pliocene). We can see on seismic cross sections that it is genetically related with the second order depocenter in the basin resulting from basinward shelf break shift after MF 7 Ma.

The size of individual bars and their connectivity depend on their position in the stratigraphic hierarchy. In a regressive pattern the sand quantity increases; bars can reach extensive dimensions and can be in fluid and pressure communication. In a transgressive pattern bars are smaller in size, entirely surrounded by shales, thus limiting the communication.

Fluvial channels form meandering point bars migrating in a south-north direction surrounded on their top and bottom by marine shales. They form excellent quality reservoirs.

INTRODUCTION AND REGIONAL SETTING

Sisi-Nubi field is a gas field discovered by Total Indonesie at the end of the 80’s. It is part of the Mahakam first order sedimentary prism (Miocene time to present) deposited during the compressional regional tectonic regime (Cibaj et al. 2014).

Structural Geology

The geological Formations in the Lower Kutei basin dip from west (onshore, Samarinda anticlinorium), to the east, towards Mahakam area and beyond the offshore (McClay et al. 2000).

Five parallel structural trends, oriented north east-south west (parallel with the shelf edge), are recognized in the Mahakam sedimentary prism (modified after Duval et al., 1998, and Lambert et al., 2003, figure 1). Sisi-Nubi field is situated in the external axis.

Stratigraphy of Mahakam first order sedimentary prism (Cibaj et al. 2014)

The Sisi-Nubi Producing interval is essentially formed by Upper Miocene sediments (figure 2).