Paleogene Marine Clastics of the Mangkalihat Peninsula, Borneo: Implications for Petroleum System Development

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Paleogene clastics are widely reported to have source and reservoir potential in SE Asian Tertiary marine rift-related basins. However, with limited outcrop or subsurface data the sedimentology, diagenesis and petroleum systems development are poorly studied. In order to address questions of: i) controls on petroleum systems variability, ii) influences on reservoir quality, and iii) issues of petroleum systems volumetrics and quality, coastal and deep marine Paleogene siliciclastic successions were investigated at outcrop from the Mangkalihat Peninsula, Borneo. Succession characteristics are:

● **NW Mangkalihat** - Deep-water Maliu Mudstone - The Maliu Mudstone consists mainly of dark grey, low-energy, bathyal mudstones of Eocene age. Fine sand- to siltstone greywacke interbeds are interpreted as distal turbidites. Calcite cements are common in the sandstones and intergranular porosities are ~2-4%. The provenance, poor sorting and diagenesis of the sandstones results in poor reservoir quality, although source and reservoir potential are known from nearby subsurface proximal turbidites.

● **NE Mangkalihat** - Coastal Sembakung Formation - Paleogene interbedded coals, sandstones, claystones, and arenaceous carbonates are poorly exposed as fault bounded inliers. Deposition occurred in a range of protected swampy to brackish settings, tidal flat and channel environments with an up sequence change to a shallow marine mixed carbonate-clastic shelf influenced by faulting. The coals and organic-rich clays may have source potential, whereas the sandstones are possible reservoir units (10-15% porosity). Clays may reduce permeability or compartmentalize the system.

Provenance, regional context and summary - Provenance studies show clastics in the west were derived from a volcanic and low grade metamorphic terrain, whereas those in the east came from a higher grade metamorphic source with some cherts. The different source terrains and depositional settings (bathyal and a mixture of coastal, shallow marine and fault-bounded deeper grabens) is consistent with early Paleogene block and basin development influencing environments and sediment pathways. Highly localized environments associated with this tectonically complex setting may limit the volumes and quality of potential source and reservoir rocks. Provenance, diagenesis, basin evolution as well as depositional environments all strongly influenced the potential for a working petroleum system.