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## Possible source for the Tembungo oils: evidences from biomarker fingerprints

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The Tembungo field located offshore Sabah is a highly faulted anticlinal structure where oil and gas accumulations occur in different fault blocks. This paper discusses the source rock potential, organic matter type, thermal maturity, oil-oil and oil-source rock correlations, biodegradation and migration of the crude oils in the Tembungo field.

The shales of the Tembungo wells have poor to fair source rock potentials, mainly of Type III with minor contributions from Type II organic matter. Maturity data show that the organic matter in the Tembungo well sections are immature.

Tembungo crude oils from the different fault blocks are genetically similar, being paraffinic and contain low sulphur and wax, with moderate API gravity. The presence of  $C_{24}$  - tetracyclic terpanes, 18(H)- and 18 $\beta$ (H)-oleananes, resin triterpanes compounds and predominance of  $C_{29}$  -steranes in all the samples suggest that the oils were derived from source rocks of terrigenous origin containing different mixtures of land-plants organic matter including resins. GC and GCMS analyses indicate that the crude oils produced from the same fault block have a similar biomarker distributions but some variations occur in oils from different fault blocks. These variations are interpreted as due to the effect of migration and biodegradation whereby each fault block has a separate fluid system and there was no intermixing between oils of the different blocks.

Oil-source rock correlation between Tembungo oils and extracts from the field and adjacent wells indicate that the oils were not generated *in-situ*, but had migrated from deeper sources.

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