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ABSTRACT OF POSTERS

Poster 1

ORGANIC FACIES VARIATION IN LACUSTRINE SOURCE ROCKS IN THE SOUTHERN MALAY BASIN

ABDUL JALIL MUHAMAD AND AWANG SAPAWI AWANG JAMIL

PETRONAS Research Sdn Bhd, Lot 3288 & 3289, Off Jalan Ayer Itam,
Kawasan Institusi Bangi, 43000 Kajang, Selangor, Malaysia

This paper attempts to look at, in more detail, the source rock quality of the lacustrine shales within the Groups K, L and M in the southern flank of the Malay Basin. This study is made possible through the use of state-of-the-art linked-scan gas chromatography / mass spectrometry / mass spectrometry or GCMSMS to provide highly sensitive measurements of biomarkers which are typically in low concentrations in source rock extracts and oils, and especially so in condensates. Since only one well dataset is available, only the vertical variation in the source rock quality of the lacustrine shales is discussed. Stratigraphically, there is a noticeable change in the source rock quality within the three groups. In general, the TOC content of the lacustrine shale sequences in Groups K, L and M range from 0.35 to 2.00 wt% (Fig. 1). Kerogen composition of these shales varies, showing mixtures of Type II and Type III indicating variable contributions from algal, bacterial and higher plant organic matter deposited in a highly to less oxidising environment (Fig. 2). This is indicated by hydrogen index (HI) values ranging from 137 to 403. Group L lacustrine shales seem to provide the best oil-prone source rock with TOC values of 0.45 to 1.95 wt% and HI values in the range of 300 to 400 indicating predominantly Type II kerogens (Fig. 2).

The variation in the source rock quality within the Groups K, L and M may be due to a combination of organic source input and factors controlling the preservation of organic matter within the environments of deposition. This observation is supported by data from screening and microscopic analyses of whole rocks and, alkane and biomarker analyses of source rock extracts. It appears that Groups L and M shales, deposited in a lacustrine environment, received more algal input compared to terrigenous organic matter in a less oxic condition resulting in relatively better organic matter preservation. This is shown by the lower Pr/Ph ratio in the range of 3.1 to 4.0, lower Tm/Ts ratio, moderate to high abundance of C30-diahopane and low abundance of tricyclics and gammacerane (Figs. 3-5). On the other hand, the younger Group K had more fluvial influence and consequently received relatively more terrigenous organic matter input being deposited in a more oxidising environment. This is indicated by the higher Pr/Ph ratio (5.1 to 6.2), higher abundance of oleanane, predominance of C29-steranes compared to C27- and C28-steranes, and trace amounts of tricyclics and gammacerane (Figs. 3-5). It is also observed microscopically that Group K has higher abundance of terrigenous-derived vitrinite particles available for measurements as opposed to Groups L and M. The marked change in organic facies within the lacustrine shales from Groups L and M to Group K is reflected in the evolution of the Malay Basin i.e. the transition from synrift to post-rift phase during the L and early part of K times.

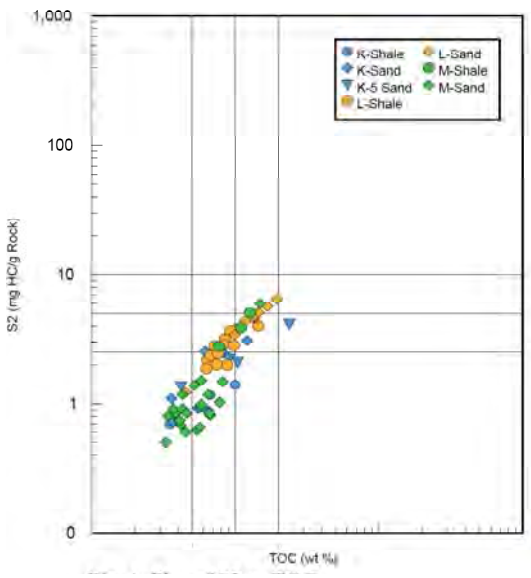

Figure 1: Plot of S2 vs. TOC

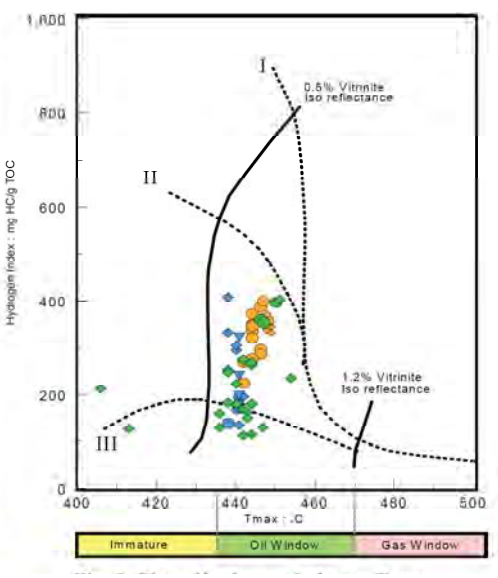

Figure 2: Plot of hydrogen index vs TMax

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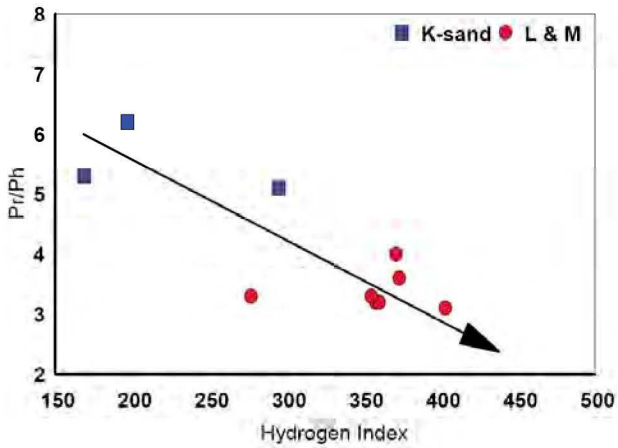

Figure 3: Plot of Pr/Ph vs hydrogen index

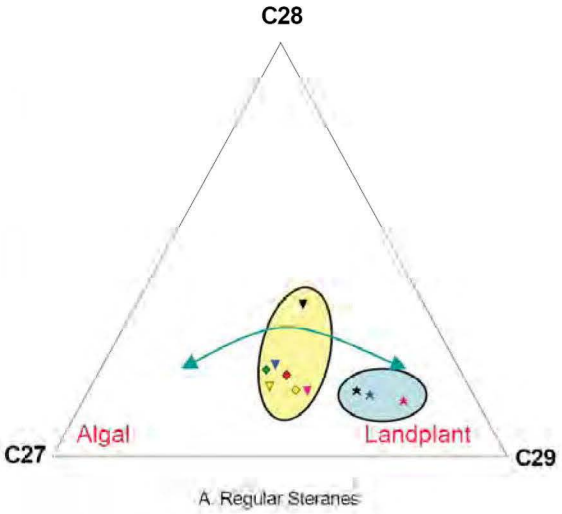

Figure 4: Ternary plot of C27-,C28-, and C29 Steranes

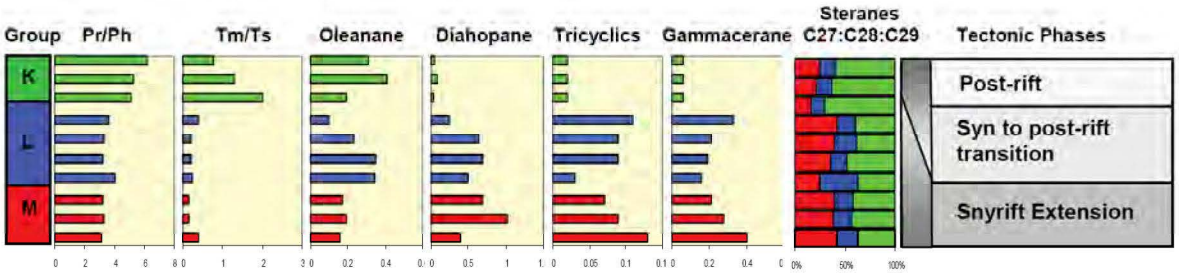

Figure 5: Profiles showing changes in biomarker abundances within Groups K, L and M