

Biomarker characterization of Cenozoic Coals of Sarawak Basin, Malaysia: Implications for thermal maturity, petroleum source potential and depositional conditions.

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Abstract.

Tertiary coals from Mukah-Balingian (MB) and Merit-Pila (MP) areas of Sarawak Basin, Malaysia were investigated using organic petrographic, bulk geochemical and biomarker analyses to determine the maturity, generation potential, organic matter input and depositional environment of the samples. Rock-Eval T_{max} (390-420°C) and hydrogen index (68-258 mgHC/g TOC) data indicate the samples are immature, contains mainly type-III kerogen and thus, possess poor liquid hydrocarbon generation potential. Measured reflectance of 0.27-0.41%Ro and 0.37-0.43%Ro in the MB and MP coals, respectively, corroborates the T_{max} data. The aliphatic fractions are characterized by a dominance of high molecular weight alkanes with strong odd-over-even predominance in the C₂₅-C₃₃ range and preponderance of hopenes and $\beta\beta$ hopanes. High pristane/Phytane ratios in the MB (0.9-7.2) and MP (3.0-14.1) coals indicate that MB and MP coals were mainly deposited under sub-oxic to oxic and fully oxic conditions, respectively. Phenanthrene, dibenzothiophene and dibenzofuran were observed in the samples and the variations in their distribution can be useful indicators of organic matter input and depositional environment. The MB coals are dominated by phenanthrene (82%) with low relative abundance of dibenzothiophene (11%) and dibenzofuran (7%), which is deemed typical of terrestrial organic matter in freshwater depositional environments. In contrast, the MP coals have similar relative average abundances of phenanthrene (49%) and dibenzothiophene (48%), suggesting a greater marine influence in the MP coals and thus, indicative of terrestrial organic matter deposited in paralic environment.

Keywords: Coal, Sarawak, Thermal Maturity, Generation Potential, Depositional Environment