Organic geochemical characteristics and paleoenvironmental conditions of Tertiary sediments deposits in the Penyu basins, Malaysia

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***Abstract*—** Detailed geochemical and petrographic characterization of the Tertiary organic facies of the eastern Chenor area of the Penyu basins was carried out to unraveled its hydrocarbon potential. Towards achieving the goal, this study focus on determination of organic matters richness , type and origin as related to their paleoenvironmental conditions of the carbonaceous mudstone and shale using organic petrography combined with organic and inorganic geochemistry.

Biomarkers signatures and chemical compositions suggest a predominantly terrestrial source input with a minor contribution from aquatic microorganism as indicated by aliginite. Integration of biomarkers studies with bulk geochemical and petrographic analysis reveal that the analyzed samples were deposited in a fresh water lacustrine environment. under suboxic bottom water conditions. This is consistence with observation based Sr/Br, V/Ni and Pr/Ph ratios. Stratified fresh water column with suboxic bottom water conditions contribute to organic matter (OM) preservation in the mudstone and shale samples. Moreover, high bioproductivity in combination with OM preservation favoured more oil associated kerogen type I and II (algae) enrichment in the mudstone and shale facies. Also, the high organic matter content in the shale may be related to fine-grained matrix and the associated semi-arid climate in the area. Based on hydrogen-to-carbon (H/C) versus oxygen-to-carbon (O/C) ratios, the organic matter type of the analysed samples is shown to be of Types I and II kerogen. This is supported by the abundant liptinitic materials (i.e., fluorescing bitumen, alginate, spore, resinite, liptodetrite and amorphous organic matter).

***Keywords*—** Environmental conditions; Biomarkers; Bioproductivity; Organic matter preservation.