Seminar by staff of Geology Department, University of Malaya — Abstracts of Papers

Depositional palaeoenvironment characterization — An organic geochemical approach (a case study from Spitsbergen)

Wan Hasiah Abdullah
Department of Geology, University of Malaya

Depositional palaeoenvironment characterization based on organic geochemical parameters formed part of an organic facies evaluation carried out on Carboniferous to Tertiary sedimentary sequences of Spitsbergen. In this study, the organic facies is defined by the biomarker distribution, distinctive kerogen assemblages, TOC content and pyrolysis data. Among the Carboniferous sediments, coals of peat-swamp type environment and lacustrine environment can be differentiated based on their distinct organic facies. The Permian limestones, deposited within a shallow marine environment are shown to be strongly influenced by terrestrially-derived organic matter. The Triassic and Jurassic sediments, deposited within a marine setting of shallow to deep shelf environment also indicate organic facies characteristics dominated by terrestrial markers. Coals and carbargilites of the Tertiary and Cretaceous samples studied were mainly deposited within peat-swamp environments of a deltaic setting. Coal-facies analysis performed on these coals/carbargilites has been able to differentiate between forest-swamps of upper delta plain setting and limnotelmatic or limnic depositional environments of lower delta plain setting.

Distinctive terrestrial markers include the presence of coaly particles, very high TOC content, low HI values, high pristane/phytane and Tm/Ts ratios, high concentration of C_{24} tetracyclic terpane, and pyrolysis-GC traces dominated by phenolic and aromatic compounds. Marine and lacustrine markers share some common organic facies characteristics such as high "aquatic ratio", high concentration of tricyclic terpanes, abundant n-alkanes with low-mid range members, relatively lower pristane/phytane and Tm/Ts ratios compared to coaly sediments and Py-GCs dominated by n-alkane/alkene doublets. Distinction between lacustrine and marine facies could be made, however, by the algal assemblage present (*Botryococcus* in lacustrine, *Tasmanites* in marine) and by the higher organic richness and hydrogen indices in the lacustrine facies.