

Organic geochemical characterization of Miocene shale in Lower the Kutai Basin, East Kalimantan, Indonesia

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The Lower Kutai Basin is a Cenozoic basin which underlies the region surrounding the recent Mahakam Delta, on the East coast of Kalimantan, Indonesia. A geochemical screening was performed to determine source rock potential of the section in the Lower Kutai Basin. Thirteen of the samples are shales with minimum TOC value of 1.16 % at 1,270 m and maximum TOC value of 5.32 % at 1,200 m. The average TOC of the shales is 2.50 %, which indicates a good source rock potential. This is further supported by the potential yield data which show more than 1 mg/g yield for all the samples. The hydrogen of the shales suggest that they are gas prone, except one sample of carbonaceous shales which shows exceptionally high HI value 450 indicating oil prone source rock. Kerogen typing and elemental analyses on shales indicate mostly type III kerogen with some indications of oxidation and reworking contained in the samples. The dominant maceral is vitrinite, and only rare trace liptinite occur in the samples. All of the organic matter in the samples are inferred to be coming from terrestrial plants associated with mangrove swamp environment. Oil production index were relatively high (up to 0.28) above the 1,890 m fault, which were most likely caused by migrated oils. Below the fault, which was in the shaly interval, the OPI dropped to 0.1 and no oil shows were found. The vitrinite reflectance of the shallowest sample is 0.64 % at 1,200 m, and the reflectance rises gradually downsection to reach 0.70 % at 1,280 m. Below this depth, the reflectance values remain approximately constant over the interval 2,016 to 2,213 m, suggesting the presence of a thrust fault. Given the fact that the maturity of the samples is about the same on both sides of the fault, it seems that the 1,890 m fault has been acting as a conduit for migrating hydrocarbons up to the hanging wall from deeper mature source rock to the East (Nilam Syncline).