Poster 3

Geochemistry of gases in the Malay Basin

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Three end-member gas types, which are biogenic gas, thermal gas, and basement gas have been identified in the Malay Basin, by using compositional and carbon-isotope data for C1–C3 hydrocarbons and CO_2. The thermal gas was divided into two subgroups: "normal" thermal gas originating at relatively shallow depths, and "deep" thermal gas from more-deeply buried source rocks.

Most gases in the Malay Basin are composed of mixtures of two or three end members. Gases with a significant biogenic component are limited to the northeast corner of the basin, and do not appear to offer an important exploration target in the Malay Basin.

Gases dominated by the basement-sourced CO_2, are found along a discontinuous trend from Dulang to Ular, and along another near the Bunga Pakma, Bunga Orkid and Bunga Raya wells. Because these gases have migrated vertically from the basement, they dominate only where extensive fault systems extend all the way to the basement. Some gas accumulations along this trend are very large and they are at risk of being dominated by basement-sourced CO_2.

The gas in the north central part of the basin appears to be mainly of "normal" thermal origin. Accumulations are of moderate size. Lack of contamination by basement gas and "deep" thermal gas in this area, suggests a lack of deep faults. Lack of fault-related vertical migration pathways limits the volume of hydrocarbon gas in this area, and thus downgrades its exploration potential except where there is local evidence for deep vertical faults.

"Deep" thermal gas seems to dominate over "normal" thermal gas in the large accumulations. This observation suggests that the key to finding large gas reserve is the presence of vertical faults which drain the deep source rocks in which the "deep" thermal gas was generated, but which do not extend all the way to basement. The region between Damar and Tujoh, where large reserves are present with only moderate amounts of CO_2 may serve as a model for this type of migration. Integration of these data with analysis of structural styles should provide important guidelines for future gas exploration in the Malay Basin.