

## Thermal studies in oil basinal areas of Indonesia

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The influence of heat flow in hydrocarbon maturation has been evaluated. Two extreme cases of basin were observed : the Central Sumatra basin, a hot back-arc basin in which the average heat flow is high ( $127 \text{ mW/m}^2$ ), and the Natuna basin, a relatively cool intra cratonic basin, where the mean heat flow value is less than  $80 \text{ mW/m}^2$ .

The measured heat flow values have been correlated with age of the last tectono-thermal event, other geophysical, geological and geochemical information. A numerical model is then applied to quantify the rate of sedimentation, subsidence history, source rock maturity, direction and rate of hydrocarbon migration.

The model is based on thermal and lithostratigraphic data. Heat transfer is described using a numerical one dimensional method of finite difference, and is developed to allow the quantification of organic matter maturation by entering the heat flow factor (HTFI).

The explicit presentation of heat flow in the HTFI formula enables us to differentiate two neighbouring wells with the same lithology but have different heat flow value. In this case, the depth to the oil ceiling in each well should be different.

Empirical manipulation has been made to describe the relationship between heat flow and the depth to the top of early maturation zone, using exponential fit and linear regression approach.

From several resulted cross sections showing the relationship between heat flow and tectonic setting, it is discovered that the heat flow values of the basement high in the Central Sumatra basin are generally higher than those in the depression zone. The inverse of that is recognized in the Natuna basin, where the basement highs exhibit relatively lower heat flow values compared with those of surrounding lows.