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Heat Flow and Surface Geochemistry on the Brunei Continental Margin

Simultaneous heat flow and geochemical coring at 186 sites result in a mean heat flow of 77.6 +59.8 mWm^{-2} for our offshore Brunei survey area. This value is comparable to that reported for ocean ridges, with high standard deviation attributed to hydrothermal circulation. Abundant thermogenic hydrocarbons appeared at 24 sites, all but one confined to the landward half of our area where the mean heat flow is 83.7 +66.5 mWm^{-2}. Eight of the 23 sites exhibit heat flow >99 mWm^{-2}. In contrast, the mean heat flow elsewhere is 59.0 +22.6 mWm^{-2}2. An apparent seep with a maximum measured heat flow of 604 mWm^{-2} coincides with the best documented thermogenic hydrocarbons, and the three most significant zones of thermogenic hydrocarbons are all closely associated with hotspots. Of the five sites containing condensate three are associated with high (>90 mWm^{-2}) heat flow and two are associated with low (29.5 and 33.3 mWm^{-2}) heat flow. A 15 km by 30 km zone of active hydrothermal circulation correlates well with observed biodegraded thermogenic hydrocarbons. Results place new constraints on seafloor thermo-chemical models and demonstrate that heat flow can be used to adjust a marine geochemical survey in the field. True 1:1 heat-flow and surface geochemical data coverage is only possible via the Ewing method and the closest approximations using violin bow heat-flow instruments are operationally prohibitive.

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