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Constraints on Hydrocarbon Maturation and Continental Margin Prospectivity from Sequential Structural Modeling: Examples from the Brazilian Margin

The south Atlantic margins formed as a result of continental separation during the Cretaceous. Beginning in the south during Barremian time, separation propagated north with final decoupling of Africa and South America occurring in the Campanian along the Equatorial Margin. Both prior to, and during this, areas adjacent to the present day margins underwent rifting, which, in the area south of the Rio Grande Transform Zone, was accompanied by the extrusion of continental flood basalts.

Intra-continental rifting, continental trap scale magmatism and continental separation all have associated heat flow implications that impinge on the petroleum system. Along the rifted margins of the South Atlantic the main source rock interval is Neocomian to Barremian in age forming part of the late syn-rift to early post-rift fill of the main rift event, being coeval with and post-dating the main volcanic episode. Source rock deposition occurred before continental separation.

Through flexural forward and reverse modelling the impact of these events on source rock maturation calculations are assessed, in terms of the resultant basement heat flow anomalies. Sequential restoration of thin-skinned tectonic effects also allow for better isolation of the thermal signal responsible for marginal subsidence. Results suggest that the effect of continental separation, with regard to the width of the continental crust affected by break-up related heat flow, is laterally variable along the margin. In addition the possibility exists that rifting continued into the Aptian in the southern Brazilian Basins.