

## BURIAL AND THERMAL HISTORY MODELLING OF THE MANNAR BASIN, OFFSHORE SRI LANKA

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*The Mannar Basin is a Late Jurassic – Neogene rift basin located in the Gulf of Mannar between India and Sri Lanka which developed during the break-up of Gondwana. Water depths in the Gulf of Mannar are up to about 3000 m. The stratigraphy is about 4 km thick in the north of the Mannar Basin and more than 6 km thick in the south. The occurrence of an active petroleum system in the basin was confirmed in 2011 by two natural gas discoveries following the drilling of the Dorado and Barracuda wells, located in the Sri Lankan part of the Gulf. However potential hydrocarbon source rocks have not been recorded by any of the wells so far drilled, and the petroleum system is poorly known. In this study, basin modelling techniques and measured vitrinite reflectance data were used to reconstruct the thermal and burial history of the northern part of the Mannar Basin along a 2D profile.*

*Bottom-hole temperature measurements indicate that the present-day geothermal gradient in the northern Mannar Basin is around 24.4 °C/km. Optimised present-day heat flows in the northern part of the Mannar Basin are 30-40 mW/m<sup>2</sup>. The heat flow histories at the Pearl-1 and Dorado-North well locations were modelled using SIGMA-2D software, assuming similar patterns of heat flow history. Maximum heat flows at the end of rifting (Maastrichtian) were estimated to be about 68–71 mW/m<sup>2</sup>.*

*Maturity modelling places the Jurassic and/or Lower Cretaceous interval in the oil and gas generation windows, and source rocks of this age therefore probably generated the thermogenic gas found at the Dorado and Barracuda wells. If the source rocks are organic-rich and oil- and gas-prone, they may have generated economic volumes of hydrocarbons.*

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**Key words:** Mannar Basin, Gulf of Mannar, Sri Lanka, Pearl-1, Dorado-North, heat flow, thermal history, burial history, vitrinite reflectance, maturity modelling, hydrocarbons.

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