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MOHO DEPTH VARIATION IN MANNAR SUB-BASIN FROM GRAVITY DATA

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The Mannar basin, a sub-basin of the Cauvery basin, has always been the focus for geophysical and geological research because of its location between Sri Lanka and India. Wolfram Mathematica algorithm has generated 2D gravity response using the polygonal method in a counter-clockwise manner, identifying different layers present in the region of interest in relation to 2D seismic interpretations to provide evidence to the depth of subsurface structures. Four major horizons were demarcated in ten (10) 2D seismic profiles; water bottom, volcanic top, volcanic bottom, and acoustic basement in the time domain. These lines were extended in either direction across the basin to meet the landmasses to depict clear structural settings of the basin. The thickness of sedimentary horizons in extended parts were assigned using the theory of passive margins, and volcanic layer extensions were assessed through the Petroleum Resources Development Secretariat (PRDS) data repository. Velocity grids were used to convert subsurface models to depth domain using density values of 1.03, 2.50 and 2.90 g cm^{-3} for water, sedimentary and volcanic layers, assessed from well-logs available in the region. The density of the crust was assumed as 2.67 g cm^{-3} as globally accepted, and the mantle density was assigned a value of 3.40 g cm^{-3} to estimate the depth to a regionally arcuate, upwelled mantle. The maximum depth to the upwelled Moho was recorded as ~24 km along the profiles SL05-23 and SL05-25. Subsurface models clearly illustrate crustal thinning in the region. After removal of residual gravity, the regional mantle gravity grid correlates to an upwelled mantle. The maximum crustal thickness along a stretch of 50-150 km in the offshore region was recorded as ~15 km along the profile line SL05-05 and the minimum value of ~3 km was noted along the profile line SL05-25. The derived results classify the Mannar basin as a failed rift, which did not succeed to develop as a spreading centre within the oceanic crust.

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