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Measurement of sediment and crustal thickness corrected RDA for 2D profiles at rifted continental margins: Applications to the Iberian, Gulf of Aden and S Angolan margins

Leanne Cowie and Nick Kusznir
University of Liverpool, Earth, Ocean and Ecological Sciences, Liverpool, United Kingdom (l.cowie@student.liv.ac.uk)

Subsidence analysis of sedimentary basins and rifted continental margins requires a correction for the anomalous uplift or subsidence arising from mantle dynamic topography. Whilst different global model predictions of mantle dynamic topography may give a broadly similar pattern at long wavelengths, they differ substantially in the predicted amplitude and at shorter wavelengths. As a consequence the accuracy of predicted mantle dynamic topography is not sufficiently good to provide corrections for subsidence analysis. Measurements of present day anomalous subsidence, which we attribute to mantle dynamic topography, have been made for three rifted continental margins; offshore Iberia, the Gulf of Aden and southern Angola. We determine residual depth anomaly (RDA), corrected for sediment loading and crustal thickness variation for 2D profiles running from unequivocal oceanic crust across the continental ocean boundary onto thinned continental crust. Residual depth anomalies (RDA), corrected for sediment loading using flexural backstripping and decompaction, have been calculated by comparing observed and age predicted oceanic bathymetries at these margins. Age predicted bathymetric anomalies have been calculated using the thermal plate model predictions from Crosby & McKenzie (2009). Non-zero sediment corrected RDAs may result from anomalous oceanic crustal thickness with respect to the global average or from anomalous uplift or subsidence. Gravity anomaly inversion incorporating a lithosphere thermal gravity anomaly correction and sediment thickness from 2D seismic reflection data has been used to determine Moho depth, calibrated using seismic refraction, and oceanic crustal basement thickness. Crustal basement thicknesses derived from gravity inversion together with Airy isostasy have been used to correct for variations of crustal thickness from a standard oceanic thickness of 7km. The 2D profiles of RDA corrected for both sediment loading and non-standard crustal thickness provide a measurement of anomalous uplift or subsidence which we attribute to mantle dynamic topography. We compare our sediment and crustal thickness corrected RDA analysis results with published predictions of mantle dynamic topography from global models.