

S. Atlantic Crustal Thickness and Ocean-Continent Transition Location Derived from Satellite Gravity Inversion: Implications for Plate Reconstructions and Aptian Ocean Basin Geometry

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Satellite gravity anomaly inversion, incorporating a lithosphere thermal gravity anomaly correction, has been used to map Moho depth, crustal thickness and continental lithosphere thinning factor for the S. Atlantic and its rifted continental margins. Crustal basement thicknesses and continental lithosphere thinning factors from gravity inversion provide estimates of ocean-continent transition (OCT) location independent of magnetic isochron data. Superposition of illuminated satellite gravity data onto crustal thickness maps from gravity inversion provides improved determination of pre-breakup conjugacy and breakup trajectory of the S. American and W. African margins. The resulting maps of crustal basement thickness and continental lithosphere thinning factor have been restored to late Aptian time using plate reconstructions in order to delineate post-breakup ocean basin geometries. The new plate reconstructions to late Aptian and crustal thickness maps have been used to explore: the relationship between the Santos and Campos segments of the Brazilian rifted margin, the Sao Paulo Plateau and their African conjugate margin in the; the geometry of ocean basin to the south down to the Agulhas-Falklands fracture zone; the remaining connectivity of Brazilian-African continental crust; and the nature of the marine region to the north up to Pernambuco. The structure of the Rio Grande High, locally underlain by crust 30 km thick, its formation and its impact on the Santos-Campos segment of the Brazilian rifted margin are also explored. Gravity inversion to determine Moho depth and crustal thickness variation is carried out in the 3D spectral domain and incorporates a lithosphere thermal gravity anomaly correction for both oceanic and continental margin lithosphere. Input data used in this study is public domain satellite free-air gravity data, digital bathymetry and NOAA-NGDC sediment thickness.