



Crustal Structure and Composition of the Rio Grande Rise, South Atlantic, from Potential Field Analyses

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The Rio Grande Rise (RGR) is a region of anomalously thick crust (> 25 km thick) within the S Atlantic oceanic domain, offshore SE Brazil. It is located outboard of the Pelotas margin and is detached from the São Paulo Plateau and São Paulo Ridge of the Brazilian continental margin. Plate reconstructions of crustal thickness determined from gravity inversion show that the RGR and Walvis Ridge (WR) formed a single body resembling Iceland at around 85 Ma suggesting it was created by the interaction of a mantle plume with sea-floor spreading. Recent geological sampling of the RGR has discovered granitic rocks with ages between 0.5 and 2.2 Ga. We investigate the crustal structure and composition of three components of the RGR in order to understand its context within the geodynamic evolution of the South Atlantic and its relationship with the SE Brazilian margin.

Regional crustal cross-sections have been constructed using bathymetry, sediment thickness and Moho depth from gravity anomaly inversion incorporating a lithosphere thermal gravity anomaly correction. These have been compared with magnetic anomaly data reduced to the pole. A profile running west to east from the Pelotas margin oceanward across the RGR shows that the Western, Central and Eastern RGR are underlain by thick crust (with deeper Moho) separated by oceanic crust with normal thickness and bathymetry. The thickest crust is located in the Central RGR (> 25 km) and is correlated with a very large magnetic anomaly (C34) reaching 450 nT.

We observe a direct correlation between thick crust and high positive amplitude magnetic anomalies, suggesting that igneous rocks are present within the RGR. The thick crust may be associated with continental material proposed for the RGR which may have been separated from the Brazilian Margin by a series of ocean ridge jumps.