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## **New Constraints on the Nature and Composition of the São Paulo Plateau, Santos Basin: Magmatic, Continental or Hybrid Crust?**

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### **Introduction**

The São Paulo Plateau (SPP) is located in the outer Santos Basin on the southeastern Brazilian margin and extends more than 500 km oceanward with an average crustal thickness of 15 km (Evain et al., 2015). Multiple magmatic additions associated with poly-phase rift deformation (Araújo et al., 2022), and the development of thick evaporitic deposits make it particularly challenging to determine the crustal composition of the SPP. Consequently, there is no present consensus on the nature of the SPP crustal basement; proposed crustal compositions range from entirely continental to entirely magmatic or oceanic. In this work, we use combined geophysical and geodynamic analysis applied to geophysical and geological datasets to investigate the composition of SPP crustal basement and to map the distribution of the different crustal types.

### **Method**

We use a combination of geophysical analytical techniques to constrain crustal basement type. These techniques consist of: (i) gravity anomaly inversion to predict Moho depth, crustal basement thickness, and lithosphere thinning factor; (ii) joint inversion of gravity data and time-domain seismic Moho TWTT to predict lateral variation in crustal basement density; (iii) sediment corrected residual depth anomaly (RDA); and (iv) magnetic anomalies reduced to the pole (RTP magnetic anomalies) and transformation of magnetic anomaly to pseudo-gravity. In addition, we use flexural-backstripping and reverse post-rift thermal subsidence modelling of base and top salt to constrain rift age and the magnitude of lithosphere thinning.

We apply the above techniques in both 2D and 3D. 2D analysis is applied to the deep long-offset seismic reflection line BS1-575, made available to us by TGS-ION. 3D analysis is applied to grids of top basement, base salt, top salt and bathymetry provided by Ecopetrol, derived from seismic reflection interpretation and covering most of the Santos and Campos Basins offshore SE Brazil.

### **Results and Conclusions**

Using the integrated analysis of combined geophysical and geological datasets, we show the existence and distribution of thinned continental, hybrid crust (thinned continental crust with magmatic addition) and entirely magmatic crust on the SPP. These distinct crustal compositional domains highlight the complex and protracted evolution of the SPP, characterized by polyphase rifting and multiple magmatic additions that collectively shaped its geological history.

Salt palaeo-datum modelling distinguishes syn-tectonic from post-tectonic salt and demonstrates the contrasting consequences of magmatic versus thinned continental SPP crust on the palaeo-bathymetry of Aptian salt deposition. We show that the distribution of post-tectonic salt primarily corresponds to that of continental crust thinned by widespread early Aptian rifting while syn-tectonic salt locations correspond to that of late Aptian magmatic crust.

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