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INTEGRATION OF CHACO-PARANÁ AND PARANÁ BASINS TERRESTRIAL GRAVITY DATA USING GOCE GEOPOTENTIAL MODEL: A MAJOR PROTEROZOIC TO CAMBRIAN SUTURE REVEALED

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The Chaco-Paraná basin (CPB) is located mostly in the north-eastern Argentina, covering an area of approximately 700,000 km^2 in a lowland region (~100 m a.s.l.), known as Chacopampean plain. The average sediment thickness of the basin is 4,000 m, and along the Las Breñas fault zone the sediment thickness may reach more than 6,000 m. The Paraná basin (PB) is located in south Brazil, covering an area of over 1,000,000 km^2 and its cumulative sediment and basalt thickness reaches up to 7,000 m. The topography over the PB is more irregular and has an average altitude of 700 m around its borders and of 300 m along the Paraná River. This work aims to provide crustal and lithospheric properties underneath the CPB and the PB from terrestrial gravity data. For this purpose, a Bouguer anomaly map between 45-65° W and 10-35° S was obtained integrating public available terrestrial gravity data from IGN (Instituto Geográfico Nacional), in Argentina, with Brazilian and surrounding countries' gravity data collected by several institutions and integrated by Sá (2004). The terrestrial gravity data from IGN was compared with a geopotential model (Pail *et al.*, 2011) derived from GOCE mission in order to assess its quality and reference system. In Argentina, a total of 5243 stations were edited and the residual histogram, the difference between IGN and GOCE Bouguer values, shows a standard deviation of 10.85 mGal and a mean value of -14.04 mGal. This analysis confirmed that IGN data were referenced to Miguelete local datum, thus a -14,97 mGal correction (Introcaso, 1997) was applied in order to tie them to the IGSN71. Regions devoid of data were completed with the SAGM04 (Sá, 2004) geopotential model. Figure 1a shows the gravity database used to generate the 5´x 5´ gridded Bouguer anomaly map (Fig. 1b, colour). This map was upward-continued to 30 km (Fig. 1b, contours) in order to highlight deep crustal and lithospheric density variations. The most prominent gravity feature is a first order lateral change in the regional gravity values between CPB (average of +10 mGal) and PB (average of -70 mGal). This linear gravity feature extends north-south continuously along the 55° W longitude from the south of the Amazon craton (latitude 15° S) to latitude 30° S, where it diverges eastward over the Torres syncline and terminates at the continental margin (Pelotas basin). This large scale gravity feature separates two distinct crustal and lithospheric domains. Recent crustal thickness compilation for South America by Assumpção *et al.* (2013) indicates a thick crust in the PB area (> 42 km) and a much thinner one in the CPB (< 35 km). Also, upper mantle seismic tomography by Schaeffer and Lebedev (2013) shows lower S-velocity anomalies under the CPB, whereas high velocities are observed under the PB. This thicker crust and the relative higher topography over the PB may be due to underplating and crustal growth (Mariani *et al.*, 2013) during the Serra Geral volcanism in the Early Cretaceous. Cambrian age (~530 to 550 Ma) granitic rocks are found along the gravity gradient, some of them are syn-collisional and of calc-alkaline composition, such as the ones intruded between Pantanal and Paraná basins (Godoy *et al.*, 2010), in eastern Paraguay (Wiens, 1986) and in SE Brazil (Phillip *et al.*, 2002). These granites are the geological evidence of a Neoproterozoic or older suture zone. The circular gravity highs on the western side of this suture are cratonic blocks, e.g. Rio Apa to the north and the Rio de La Plata to the south, buried under the CPB sediments. The Rio de La Plata craton has been mapped with MT soundings by Orozco *et al.* (2013) as a geoelectrically highly resistive crust and upper mantle. These blocks were amalgamated with the NE-trending terranes and small cratonic blocks buried under the PB Paleozoic sediments. No gravity evidence of a major lithospheric scale gravity feature is observed which could be correlated with the proposed Transbrasiliano Lineament (Cordani *et al.*, 2003). Our geophysical findings set a new tectonic framework to study West Gondwana evolution.

Gravidade
Proterozóico
Cambriano
Bacia do Paraná

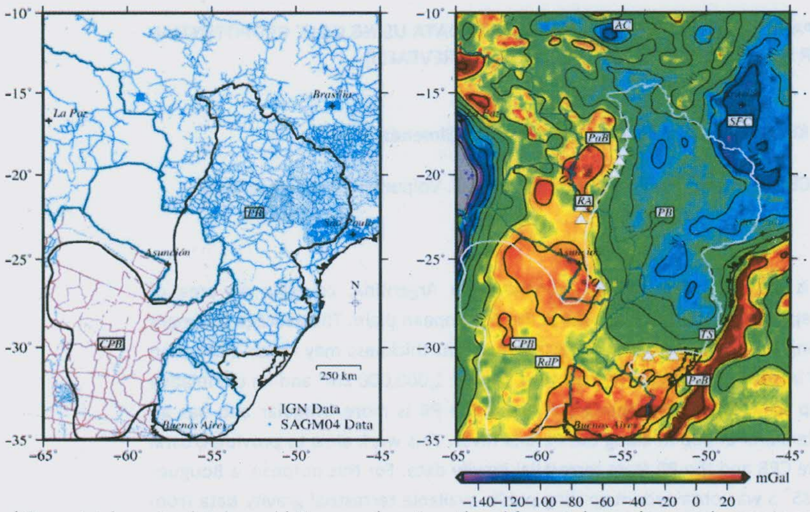

Figure 1: a) Terrestrial gravity database. b) Bouguer (continent) and free-air (ocean) anomaly map in colour and upward continued at 30 km shown in 10 mGal interval contours. Chaco-Paraná and Paraná basin limits in white contours. AC = Amazon craton, PB = Paraná basin, CPB = Chaco-Paraná basin, SFC = São Francisco craton, RdP = Rio de La Plata craton, RA = Rio Apa craton, TS = Torres syncline, PeB = Pelotas basin, PaB = Pantanal basin. White triangles are the location of Cambrian-age granites.

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