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Lithospheric investigations of the intra-cratonic Paraná and Chaco-Paraná basins integrating terrestrial gravitry, satellite gravity gradiometry, geomagnetic and electromagnetic soundings.

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A very extensive region in central-eastern South America was the site of subsidence and uplift cycles that yielded successive phases of deposition, erosion and magmatism during the entire Phanerozoic period. This region constitutes today the Paraná and Chaco-Paraná intracratonic basins. In order to link the sedimentary and igneous records to the controlling compressional and extensional tectonic processes that took place during that period in the underlying lithospheric plate, a long-term multi-institutional project is under way. Gravity gradient tensor data from ESA's GOCE satellites and terrestrial gravity data were integrated to produce a new digital gravity and geoid models. Electromagnetic induction tensors were obtained from geomagnetic depth soundings, deployed in an array with inter-spacing of 50-80 km over the entire study region. Electromagnetic induction data acquisition is under way using magnetotelluric methods (broadband and long-period) along profiles strategically positioned across the main regional scale gravity anomalies. A preliminary analysis of Bouguer gravity anomalies allows us to separate the Paraná and the Chaco-Paraná basins into two distinct gravity provinces. The Chaco-Paraná basin is characterized by a relative positive gravity anomaly (-40 to -20 mGal), in agreement with estimates of crustal thickness of 33-35 km obtained from receiver function studies, lower effective elastic thickness (Te $\sim$30-40 km) and negative perturbation of surface wave velocity. On the western limit of the Paraná Basin, a north-south trending Bouguer anomaly gradient lies along the 306º and 305º (-54º and -55º) meridians. Within the Paraná basin, the Bouguer anomaly is more negative (-80 to -120 mGal), in accordance with estimated Moho at depths greater than 40 km, positive S wave velocity perturbation and distinct fast polarization directions from S splitting, at lithospheric depths. Therefore, the Paraná basin lithosphere presents cratonic geophysical properties, whereas the Chaco-Paraná basin lithosphere presents non-cratonic properties. Electromagnetic induction vectors indicate the presence of a deep electric conductor along the north-south trending Bouguer gradient, which strengthen the possibility of the discontinuity being the junction of lithospheric blocks with distinct evolution, that is, a major suture zone of Cambrian age or older. Furthermore, a relative Bouguer anomaly high ($\sim$40 mGal) lies along the NE-SW direction parallel to the Paraná River, dividing the eastern part of the basin into a northwestern and a southeastern portion. This gravity anomaly was previously ascribed to crustal underplating related to the Lower Cretaceous basaltic magmatism. The electromagnetic induction data being collected will be expressed as 3-D induction tensor models associated with the lithospheric geoelectrical pattern, and will be integrated with the gravity and geoid fields and other geophysical data presently available in order to understand the tectonic and gedynamical evolution of these important intracratonic basins.