Lithospheric investigations of the large, contiguous and intracratonic Phanerozoic Parana and Chaco-Parana basins in central-eastern South America are being carried out using gravity and geomagnetic deep soundings. Gravity gradient tensor data from ESA’s GOCE satellites and terrestrial gravity data are being integrated to produce new gravity information. Geomagnetic transfer functions are being obtained from geomagnetic deep soundings deployed in an array with inter-spacing of 50-80 km covering the entire Parana basin. A preliminary analysis of the Bouguer gravity anomalies allows us to separate the Parana and the Chaco-Parana basins into two distinct gravity provinces. The Chaco-Parana 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 ~30-40 km) and negative perturbation of surface wave velocity. Within the Parana, 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 Parana basin lithosphere presents cratonic geophysical properties, whereas the Chaco-Parana basin lithosphere presents non-cratonic properties. Induction arrows indicate the presence of a deep electric conductor on the western limit of the Parana basin in agreement with a north-south trending Bouguer anomaly gradient, thus strengthening 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.