GEOPHYSICAL DEFINITION OF PARANAPANEMA PROTEROZOIC BLOCK AND ITS IMPORTANCE FOR THE RODINIA TO GONDWANA EVOLUTIONARY THEORIES

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For the last decade, only three cratonic blocks (Amazonian, S. Francisco and Rio de LaPlata) were attributed to the South America portion for the Rodinia reconstitution. The probability of existing other blocks has been ignored.

Taking into account a large gravity survey, the premise of a considerable Paleoproterozoic fragment as part of the Paraná basin basement is highly probable. After removing the gravity contribution of its sedimentary load, the gravity pattern of the basin basement framework discriminates the boundaries of a high density block (Paranapanema) from other structures, most of which outcrop beyond the limits of the basin itself. The gravity high, bounded by deep gradients is clearly isolated from the other structures, among which the buried segments of Goiás Arch, Ribeira and Brasilia Belts, and Rio de LaPlata Craton, are easily identified through their outcropping portion. The Goiás Arch gravity signature merges with the topographically defined Paraguay Arch. Important faults as Jacutinga and Lancinha-Cubatão (NE) and Torres-Posadas lineament (NW) are clearly identified through the geophysical signature; these structures define contacts among blocks at East and South of Paranapanema. The geophysical analysis also shows that any liaison between this block and Rio de LaPlata (south), or Luis Alves / Curitiba (east) Proterozoic blocks is improbable.

Deep borehole data provided the lithology, thickness and area distribution of each volcano and sedimentary layer, as well as a geochronology age determination for a
number of basement samples. Through a back stripping geophysical analysis, based on borehole data, the maximum attenuation distribution was identified for the two main extensional tectonic events that formed the Paraná basin, for a time interval that lasted from the Silurian to the Triassic. Results, based on a thermo-mechanical model, indicate that for both events the maximum attenuation sites are sub-parallel to the Brasiliano faults (NE), while the lineaments Torres-Posadas and Tietê (NW), better denoted for the second event, are parallel to the Early Cretaceous Ponta Grossa Arch.

From geological observations, the Apiaí Belt, a continental Atlantic margin to the East, the Goiás Arch, an active margin to the northwest, and the Socorro-Guaxupé Orogen, an active margin with arch formation to the northeast of Paranapanema, assign great importance to this block for describing the western Gondwana evolution and assembly. Therefore, Paranapanema should be taken into account among the lithosphere segments derived from Rodinia, and later from Western Gondwana, after undergoing a series of orogenic events. Samples from deep boreholes prove the existence of a Paleoproterozoic basement buried by volcano-sedimentary Paleo to Mesoproterozoic layers as also been observed for the Amazonian and the S. Francisco craton. Moreover, geological and geochronology studies of the Ribeira Belt infrastructure identify an increase of Mesoproterozoic rocks towards the border of Paranapanema. Shear faults of Late-Brasiliano age developed significant transitional depressions forming the precursor rifts filled with Silurian to Triassic sediments. As for Paranapanema, analogous blocks may exist under the Parnaiba basin and other structures that were activated during the Brasiliano Cycle to form Gondwana. In this light, we consider that a revision is required in order to amend the present theories on the evolutionary process from Rodinia to Gondwana.