



MAGNETOTELLURIC INVESTIGATIONS OF DEEP TECTONIC FEATURES IN THE BORBOREMA LITHOSPHERE

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A broad survey covering the Borborema Province with magnetotelluric (MT) soundings was carried out with the purpose of elaborating 2D and 3D models of the distribution and magnitude of electrical conductivity of the Earth's interior. The models are used to make inferences about its present physical state, structural features and past tectonic evolution of the region. Since conductivity is very sensitive to interconnected minor constituents (e.g. water, metallic and hydrous minerals, volatiles, melts) but much less sensitive to the bulk lithological properties, its enhancement often suggests geodynamic events leading to lithosphere hydration by rifting or mantle wedge overlying slab subduction, and its attenuation (increased resistivity) is interpreted as related to dehydration by compression mechanisms during continental collisions. Since the northeastern terrains of Brazil result from complex orogenic systems strongly affected by tectonic, metamorphic and magmatic processes that occurred during the Gondwanan amalgamation in late Neoproterozoic-early Phanerozoic times, it is not surprising that the MT models show prominent anomalously conductive zones within resistive blocks all over the province. The physical state of past tectonic features could be partially preserved even to this day, despite the destructive effects of previous recurrent tectono-thermal episodes. Regions showing resistive lithospheres in the MT models, representing less affected conditions, have been observed beneath the eastern portion of the Parnaíba Basin and in the Ceará Central domain in the west and northwest, São José do Campestre in the northeast, and Pajeú and Sergipano belts in the east and southeast of the Borborema Province. Some of these regions present geophysical characteristics that could be interpreted as cratonic at best, or remnant blocks of internally altered Proterozoic lithospheres. High conductivity anomalies appear under the Jaguaribe-Rio Piranhas domains, Araripe and Rio do Peixe basins in the northwest, Seridó Group in the east, Piancó-Alto Brigida in the center of the Transversal sub-province, and Jatobá and Tucano basins in the southeast. Several structural lineaments, shear zones and thrust-faults appear to be conditioned by resistive-conductive crustal discontinuities, particularly the Senador Pompeu, Patos and Pernambuco tectonic features. Deep plunging geoelectric features have been interpreted as fossil subduction slabs in several places. One MT profile deployed in the northwest side of the Northern sub-province indicates two distinct resistive features dipping in convergent directions from the upper crust into the upper mantle around the Tamboril-Santa Quitéria complex. This double feature is interpreted as fossil remnants of former subduction slabs, because the observed dipping resistivity zones are consistent with the presence of dehydrated oceanic crusts devoid of sediments. In the Transversal sub-province, north-dipping crustal conductors are proposed to represent remnants of a north-directed subduction zone with enhanced conductivity associated with graphitized biogenic material in metasedimentary rocks originally deposited in a restricted oceanic environment and subsequently metamorphosed and introduced into the deep crust by the subduction of the oceanic lithosphere. A similar conductor is observed plunging northward into the crust beneath the Neoproterozoic Seridó Group and the Paleoproterozoic Caicó Complex in the northeastern side of the province.

PALAVRAS CHAVE: MAGNETOTELLURIC; BORBOREMA; TECTONICS.