TECTONIC FRAMEWORK OF THE SOUTHERN PORTION OF THE PARANÁ BASIN BASED ON MAGNETOTELLURIC METHOD: A CONTRIBUTION TO THE UNDERSTANDING OF UNCONVENTIONAL RESERVOIRS

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RESUMO: The characterization of the tectonic framework of Paleozoic terrains is crucial for the investigation of unconventional fractured volcanic reservoirs. In recent years, the need for exploitation of these areas showed the value of the non-seismic methods in Brazil. Among them, the Magnetotelluric Method (MT) has excellent cost-benefit ratio, making it a high-performance tool and fast execution with great potential for crust and mantle research, including ocean environment and the exploration of metallic minerals sulfide. MT method is able to acquire resistivity data of rocks that are even 20Km deep, without losing much resolution when compared with seismic method. Here we present the results of a magnetotelluric imaging (MT) to identify and characterize the structural framework of the southern portion of the Paraná Basin, southern Brazil. We carried out a SW-NE ,1200 km-long MT profile, with 68 stations spaced between 5-15 km on the southernmost states in Brazil. The observation of the PSI profile highlights the presence of large scale NW-SE faults and emphasize the presence of two major regional structures: (i) the Rio Grande Arc in the southern portion, and (ii) the Torres Syncline in the northern portion. The Rio Grande Arc is a horst highlighted by the basement uplift and the thicker layers of sedimentary rocks in the extremes south and north of this structure. The fault system observed along the profile suggests simultaneously uplifting of the basement and deposition of the sedimentary sequences of the Paraná Basin. This hypothesis is in agreement with stratigraphic, borehole and geochronological data, which have shown that the Rio Grande arc is contemporaneous with the deposition of the Triassic to Early Jurassic sediments. The Torres Syncline is a structure characterized by the increasing thickness of sedimentary layers in the north section of our MT profile. The continuity of the layers is interrupted by large regional fault systems, which also affect the volcanic rocks of the Serra Geral Formation, indicating that the faults were active after the Cretaceous. The results show that the MT modeling brings a distinct contribution to the understanding of the present structural architecture of the Paraná basin and the construction of a model for potential fractured volcanic reservoirs.

PALAVRAS-CHAVE: MAGNETOTELLURIC METHOD, UNCONVENTIONAL RESERVOIRS, PARANA BASIN