

## **S WAVE CHARACTERISTICS OF THE BASEMENT ROCKS UNDER PARNAÍBA BASIN: S-WAVE TOMOGRAPHY AND VP/VS RATIO FROM RECEIVER FUNCTION**

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**ABSTRACT:** This work presents S wave characteristics of the basement/crust under the Parnaíba Basin - Brazil and its western/eastern limits, through combined analysis of H-k stacking method of Receiver Function (RF) and S wave tomography, from Wide Angle Reflection-Refraction (WARR) data. Located in the northern portion of Brazil, the basin lies in a vast cratonic area and records the Paleozoic sedimentation of West Gondwana, which was the result of crustal collisions involving cratonic blocks and extensive Neoproterozoic fold belts. Situated between the Amazonian craton/Tocantins Province in its western border, the São Luis craton/Gurupi belt in its northern portion, and the São Francisco craton/Borborema Province in its eastern/southern limit, Parnaíba Basin is a sag-type basin, with a grossly circular shape. Together with the Amazonas-Solimões and Paraná basins, the Parnaíba Basin is part of a set of Palaeozoic intraplate basins within the South America plate. Its depositional history spans Ordovician to Cenozoic time and it is typically associated with an extensional event, similar to the formation of Palaeozoic intraplate basins around the world. The data were acquired along an E-W 1150 km long profile, comprising the Amazonian craton, Tocantins Province (Araguaia Belt), Parnaíba Basin itself and Borborema Province. The RF data were recorded by 39 short period 3-components stations installed with 30 km intervals, working in a continuous mode during 7 months. The WARR data were recorded by the same 3-component stations plus 600 vertical component stations evenly distributed along the deployment line. The data were used to develop 2D S-wave tomography, derived from first breaks and Moho reflection phases. The results show that the eastern margin of the Amazonian Craton has an average crustal thickness of 39 km and  $V_p/V_s$  of 1.72. In the Araguaia belt domain, the crust has thicknesses between 45 and 53 km and  $V_p/V_s \leq 1.70$ , defining the front of the Amazonian paleocontinent suture. The western part of the Parnaíba basin, Grajaú sub-basin, shows a crust 42–44 km thick and higher  $V_p/V_s$  (~1.75) when compared with the Amazonian craton. East of it, the crust thins abruptly to 37 km with  $V_p/V_s$  of 1.73, and thickens to 42 km close to the eastern limit of the basin. From this point, the crust thins, reaching 35 km at the eastern limit of the profile within the Borborema Province. The mantle presents preliminary mean S velocity of 4.75 km/s under the Parnaíba Basin and around 4.6 km/s elsewhere along the profile. The S results will help to characterize the crust and better understand the geodynamic configuration of the basement rocks of the Parnaíba Basin.

**KEYWORDS:** PARNAÍBA BASIN, WIDE ANGLE REFLECTION-REFRACTION, RECEIVER FUNCTION