

Crustal thickness map in the Borborema Province (NE Brazil) from teleseismic receiver functions

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ABSTRACT: *The Borborema Province (BP) of NE Brazil covers an area of approximately 450,000 km² in the northeasternmost corner of the Brazilian shield. The Province is a tectonic collage of basement rocks of Paleoproterozoic age, also involving small Archean nuclei and Paleo to Neoproterozoic volcano-sedimentary belts, which amalgamated during the Braziliano-Pan African orogeny (~600 Ma). One of the most riveting features of the BP is the presence of Cenozoic magmatism along two orthogonal alignments: the Fernando de Noronha-Mecejana alignment (FNMA), offshore and trending in the east-west direction, and the Macau-Queimadas alignments (MQA) onshore and trending in the north-south direction. The magmatism associated with this activity has Ar-Ar ages between 2 and 50 Ma and earlier studies invoked the existence of a deep-seated plume to explain the origin of this Cenozoic activity. However, the orthogonal arrangement of the alignments and the long-lived character of the on-shore magmatism inferred from recent Ar-Ar dating have favoured the idea that shallower processes such as small-scale convection at a cratonic edge may provide a more plausible explanation for this magmatism. A recent study using analysis of P-to-S conversions at the Moho recorded at a temporary, eight-station, broadband network in NE Brazil revealed a rapid increase in the bulk Vp/Vs ratio of the Borboreman crust east of the MQA, roughly coincident with the postulated location of the small-scale convection cell responsible for the Cenozoic magmatism, and a relatively constant crustal thickness throughout the study area. Here, we present an expansion of the previous P-to-S conversion using 21 broadband stations from the newly deployed Rede Sísmica do Nordeste (RSisNE) monitoring network. The new results are consistent with our earlier observations regarding crustal thickness and Vp/Vs ratio variation across the MQA. More interestingly, they also suggest a more complex pattern of Vp/Vs ratio variation throughout the crust atop the small-scale convection cell than previously imaged. We expect the correlation of this pattern with geologic crustal features will shed light on the extent of the Cenozoic magmatism and evolution of the Province.*

KEY-WORDS: EDGE-DRIVEN CONVECTION, MAGMATISM, BORBOREMA PROVINCE, CENOZOIC VOLCANISM, RECEIVER FUNCTION