

# An improved velocity model for routine hypocenter location in Central Brazil

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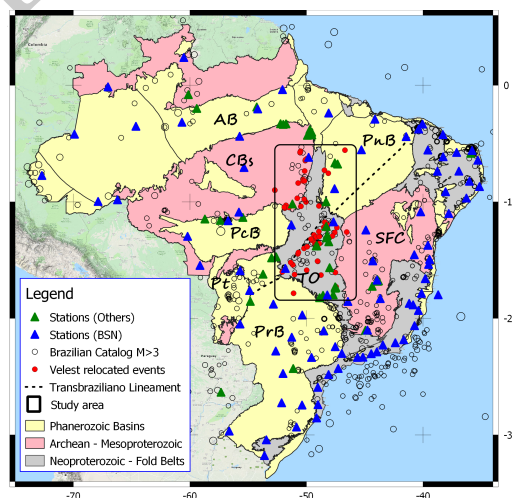
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## Abstract

Brazil is located in the stable continental interior of the South American plate. The seismicity distribution is not uniform and, with few exceptions, it is characterized by low seismicity ( $M < 3.5$ ). In the last century occurred only two dozen events of magnitudes greater than or equal to 5, two of which with magnitude larger than 6. The Brazilian Seismic Catalog - BSC (Fig. 1 - grey circles) was initially compiled by Berrocal et al. (1984) and it is maintained by a pool of institutions SIS-UnB, IAG-USP, UFRN, CPRM and ON. The BSC is very heterogeneous and the location quality for some events is unknown. A better and more uniform monitoring started after the establishment of the Brazilian Seismograph Network (RSBR) composed by 84 broad band stations completed in 2014. With the RSBR (Fig. 1-blue triangles), the detection threshold in the Amazon region dropped from M4.5 to M3.5. For the BSC earthquake location we use the generic model NewBR developed by Assumpção et al. (2010). In this study, we propose a new 1D velocity model with station delays specifically calculated for the central Brazil region (Fig. 1 – black line polygon) including most of the Tocantins Province and adjacent parts of the surrounding provinces. From a data set of 128 events listed in the BSC, we have selected, for quality reasons, 77 well-locatable events with a total of 812 P wave observations from 57 stations from RSBR and other projects. A series of coupled hypocenter-velocity-model non-linear inversions were performed with the code VELEST to search the model space for best performing results. The 77 relocated events are grouped in three regions, one in the North and one in the South with scattered epicenters and the largest event group along a SW-NE striking zone aligned with the Transbraziliano Lineament (Fig. 1). While, previously the seismicity exclusively was located at very shallow crustal levels, with the new model we do find evidence for some hypocenters located down to 20km depth.



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