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Crustal Thickness in the Southeastern Region of the Parnaíba Basin Using Receiver Functions

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Introduction

The Parnaíba basin is composed of Paleozoic and Mesozoic sediments, reaching a depth of approximately 3400 m in the center of the basin. Its basement is probably of Archaean age and a cratonic block (Parnaíba Block) is postulated at its center. The São Francisco craton limits the Parnaíba basin at its southeastern edge. The aim of this work is to use the receiver function method to determine whether the craton extends beneath the basin sediments to form a single cratonic block or whether there is a Proterozoic belt separating the cratonic blocks.

Method and/or Theory

Receiver functions are commonly used to investigate the structure of the crust and upper mantle, and are obtained from the deconvolution of the vertical component of P wave recordings from the corresponding horizontal components.

Results and Conclusions

Our analysis consisted in analyzing the moveout of crustal P-to-S conversions (HK-stacking) to develop local estimates of crustal thickness and bulk Vp/Vs ratio under seismic stations. In order to determine the nature of the contact between the Parnaíba basin and the São Francisco craton, estimates were made of the crustal thicknesses and Vp/Vs ratios along the contact zone. Crustal thickness values ranged between 35.6 and 47.8 km and Vp/Vs ratios between 1.70 and 1.77. We observe a distinctive thinning of the crust along the southern edge of the basin, suggesting that cratonic units are indeed separated by Proterozoic crust.