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Radial Anisotropy model beneath West-Central of Brazil

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Rayleigh and Love waves' discrepancy can be described by radial anisotropy that we can use to indicate crustal past and ongoing deformation. Although some previous studies (e.g., receiver function) generally suggested thin crustal in some part of West-Central Brazil, our knowledge about the crustal structure of this area is limited. Classical seismic exploration and traditional passive earthquake tomography methods are not ideal to obtain thickness and crustal structure. Besides, limitation in spatial sampling in crustal structure and regional tomographic prevent more detailed information. However, ambient seismic noise carries valuable information of propagation path which can be extracted. In other word, developments in interferometry approach have shown that the empirical Green's function between two stations can be extracted by cross-correlating of long time ambient seismic noise records.

In this study, we obtain 3D VSV and VSH and consequently radial anisotropy models for Pantanal, Chaco and Paraná in West-Central of Brazil using ambient seismic noise tomography (ANT) method. For this purpose, we used up to two years of 3-component continuous data recorded by 50 stations of the permanent Brazilian Network (BL and BR nets) and temporary deployment (XC net). All stations are equipped with broadband (120s) sensors recording at 100 sps. Data processing is similar to that explained in detail by Lin et al. (2008) including processing of overlapping six-hour time windows. The mean and trend were removed, the horizontal components were rotated and the data were decimated to 10 sps. Time and frequency domain normalizations were then applied to suppress the influence of instrument irregularities and earthquake signals. After cross-correlation and stacking procedure, we calculated both phase and group velocities of Rayleigh and Love waves by using phase match filtering and frequency-time analysis techniques. These dispersion measurements were then used with the fast marching surface tomography (FMST) technique to obtain Rayleigh and Love waves 2D tomographic models in the period range 5 to 50 s. Then, the discrepancy of Rayleigh and Love waves tomographic maps were applied to obtain radial anisotropy model in the West-Central of Brazil. This radial anisotropy model indicates thin crust beneath the Pantanal as well as beneath some parts of the Chaco Basin. Also, the radial anisotropy model indicates that the Moho depth varies between 35 and 40 km beneath the major intracratonic sedimentary basins which are in agreement with the receiver function results.