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Ambient noise Rayleigh wave tomography across Brazil: preliminary results

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Cross-correlation of ambient seismic noise has proven a valuable tool to image the structure of the crust and the upper mantle. Preliminary dispersion curves are presented across Brazil, using ambient noise observed between 2000 and 2012 at 73 broadband stations from the Brazilian Lithosphere Seismic Project, the Global Seismic Network and the GEOSCOPE network. Most of the stations lie in southeast Brazil and cover the Archean São Francisco craton, the adjacent Upper Proterozoic fold belts and the Paleozoic intra-cratonic Paraná basin. The procedure consists in stacking daily cross-correlations between pairs of stations after (1) removing the instrument response, the mean and the trend, (2) band-passing the data between 7–150 s, (3) normalizing the signal with its amplitude in the earthquake period band and (4) whitening the amplitude spectrum. This allows estimating the cross-correlations between 423 pairs of stations, whose spectra are furthered whitened. The number of pairs is reduced to 153 by imposing a minimum distance of 200 km between the stations and signal-to-noise ratios larger than 10 in the bands 7–14 s, 10–25 s and 15–35 s. A frequency-time analysis is then applied to the cross-correlations in order to extract the dispersion curves, with additional cleaning using a phase-matched filter. Given the spatial extension of the Brazilian network (about 15° by 15°), the objective is to construct group velocity maps at periods up to 25-30 s, which will provide fundamental insights into the structure of the crust and the uppermost mantle.