CRUSTAL STRUCTURE OF THE PANTANAL BASIN FROM JOINT INVERSION OF RECEIVER FUNCTIONS AND RAYLEIGH-WAVE DISPERSION

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ABSTRACT: The lithospheric structure of the South American continent has been mainly investigated through continental-scale seismic studies and a number of detailed seismic experiments in the Andean region. As a result, there is still a paucity of detailed seismic studies within the South American platform. With the aim of improving seismic coverage in the continent, the Universidade de São Paulo (USP) is presently leading an international, multi-institutional effort funded by FAPESP that focuses on investigating the deep structure under the Paraná, Pantanal, and Chaco basins through analysis of seismic data ("3-Basin Project"). To that effect, existing stations belonging to the Rede Sismográfica do Brasil have been complemented with the temporary deployment of more than 30 broadband stations throughout W-SW Brazil, Bolivia, Uruguay, and Paraguay. Here, we present preliminary results obtained from analysis of data collected at 41 stations in and around the Pantanal basin. Our study consists of: (i) an analysis of Moho P-to-S conversion phases in receiver functions to determine crustal thickness and bulk Vp/Vs ratio; and (ii) the joint inversion of the RFs and surface wave dispersion curves to develop S-wave velocity-depth profiles for the crust and uppermost mantle under each station. Estimates of crustal thickness and bulk Vp/Vs ratio have been already obtained through the H-κ stacking technique, which performs a weighted stack of the receiver functions amplitudes along phase-moveout curves through a grid-search in the H-κ parameter space. Development of velocity-depth profiles is still ongoing, and is based on a linearization of the forward problem followed by minimization of a weighted average of the root-mean-square (RMS) error for the receiver function and surface-wave dispersion datasets. A roughness norm is also included in the objective function in order to stabilize the inversion. Analysis of P-to-S conversions has revealed that Moho depths and Vp/Vs ratios vary between 33 and 50 km and between 1.56 and 1.83, respectively. Within the Pantanal basin, however, the crust is thinnest (34-38 km) and displays the smallest Vp/Vs ratios (1.56-1.69). These observations suggest that the Pantanal basin might have formed in a structurally weaker portion of the South American platform. We expect that the development of S-velocity models from the joint inversion of receiver functions and surface-wave dispersion will help clarify the relationships between crustal thickness and rheology, and provide further insight on the origin and evolution of this basin.

KEYWORDS: RECEIVER FUNCTION, SURFACE-WAVE DISPERSION, JOINT INVERSION, PANTANAL BASIN