An updated crustal thickness map of central South America based on receiver function measurements

Julia Carolina Rivadeneyra-Vera, Marcelo Bianchi, and Marcelo Assumpção
University of São Paulo, Institute of Astronomy, Geophysics and Atmospheric Sciences, Department of Geophysics, Brazil (carolina.vera@iag.usp.br)

Determining the seismic properties of continental crust is essential in tectonic studies to understand the geological evolution, as well as elaborating velocity models to better monitoring the regional and global seismicity. Since the early 90s many seismic studies have focused on the details of the crust and upper mantle in the Andean region. However most of the stable part of the continent remains poorly sampled due to its complexity and lack of seismic stations. In the previous compilation of crustal structure in South America, areas as the thin crust in the Sub-Andean lowlands and Amazon region have been largely estimated by gravity data. A deployment of 35 temporary seismic stations in southwest Brazil and parts of Bolivia, Paraguay, Argentina and Uruguay filled a significant gap in crustal information of the central part of South America. Additionally, restricted seismic stations of Bolivia and the eastern of Peru have been analyzed to better constraint our results in the Sub-Andean region. Crustal thicknesses and Vp/Vs ratios were estimated with a modified H-k method by producing three stacked traces to enhance the three Moho conversions (the direct Ps and the two multiples Ppss and Ppps). This modified method yields lower uncertainties than previous studies and shows more regional consistency between close stations. Using the temporary stations, the Brazilian permanent network (RSBR), and the restricted stations of Peru and Bolivia we have better characterized the crustal structure in the central part of South America, our results shows a belt thin crust (35-40 km) along the Sub-Andean region, which is narrower the previous works, and a normal crustal thickness average of 40 km in the central part of the South America. This study, combined with other published data, provides an updated crustal thickness map of South America that is useful for future regional studies of seismic wave propagation, gravity modeling and inferences of crustal evolution.