

A Model of Crustal Thickness for South America using Receiver Functions and Surface Wave Tomography

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ABSTRACT: Estimates of crustal thicknesses in South America are used to develop models of crustal thickness for the continent. The estimates were obtained from an extensive compilation of crustal studies published in the literature and complemented with new measurements. We considered crustal thickness estimates mainly derived from seismic datasets, such as deep seismic refraction experiments, receiver function analyses, and surface-wave dispersion velocities. Crustal thicknesses from gravity anomalies, which depend on *a priori* assumptions such as constant density contrasts across the Moho, were included only along the continental shelf to help fill large gaps in seismic coverage. Uncertainties for all compiled estimates were retrieved and taken into account during the development of the models. Two types of crustal thickness models were developed: A) a models based on point constraints alone (from receiver function studies and active-source experiments), and B) models with additional constraints from surface-wave tomography. The resulting models reveal interesting crustal thickness variations across the continent, in spite of significant gaps in the continental coverage. In the Andean range, our models show that the crust is as thick as 75 km in Southern Peru and the Bolivian Altiplano, while crustal thicknesses are normal (~40 km) in Ecuador and southern Colombia in spite of high elevations. In the stable continental platform the crust displays an average thickness of 39 ± 5 km (1-s deviation) and no clear difference is observed between low-altitude, intracratonic sedimentary basins, NeoProterozoic fold belts, and cratonic areas (except for the Borborema Province of NE Brazil). Areas of thin crust are observed in the Borborema Province of NE Brazil (30-35 km), and perhaps along a narrow belt within the Tocantins Province of central Brazil (~35 km), roughly parallel to the southeast border of the Amazon craton and possibly continuing south beneath the Chaco basin. In the sub-Andean region, between the mid-plate cratonic regions and the Andean cordillera, the crust tends to be thinner (less than 40 km thick) compared to the crust in the stable platform.

Keywords: Moho, Seismology