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Craton Heterogeneity in the South American Lithosphere

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We investigate structure of the lithosphere beneath South America using receiver functions, surface wave dispersion analysis, and seismic tomography. The data used include recordings from 20 temporary broadband seismic stations deployed across eastern Brazil (BLSP02) and from the Chile Ridge Subduction Project seismic array in southern Chile (CRSP). By jointly inverting Moho point constraints, Rayleigh wave group velocities, and regional *S* and Rayleigh wave forms we obtain a continuous map of Moho depth. The new tomographic Moho map suggests that Moho depth and Moho relief vary slightly with age within the Precambrian crust. Whether or not a correlation between crustal thickness and geologic age can be derived from the pre-interpolation point constraints depends strongly on the selected subset of receiver functions. This implies that using only pre-interpolation point constraints (receiver functions) inadequately samples the spatial variation in geologic age. We also invert for *S* velocity structure and estimate the depth of the lithosphere–asthenosphere boundary (LAB) in Precambrian South America. The new model reveals a relatively thin lithosphere throughout most of Precambrian South America ($<$ 140 km). Comparing LAB depth with lithospheric age shows they are overall positively correlated, whereby the thickest lithosphere occurs in the relatively small Saõ Francisco craton (200 km). However, within the larger Amazonian craton the younger lithosphere is thicker, indicating that locally even larger cratons are not protected from erosion or reworking of the lithosphere.