Crustal structure of Sri Lanka derived from joint inversion of surface wave dispersion and receiver functions using a Bayesian approach

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We study the crustal structure of Sri Lanka by analyzing data from a temporary seismic network deployed in 2016-2017 to shed light on the amalgamation process from the geophysical perspective. Rayleigh wave phase dispersion from ambient noise cross-correlation and receiver functions were jointly inverted using a transdimensional Bayesian approach.

The Moho depths range between 30 and 40 km, with the thickest crust (38-40 km) beneath the central Highland Complex (HC). The thinnest crust (30-35 km) is found along the west coast, which experienced crustal thinning associated with the formation of the Mannar Basin. Vp/Vs ratios lie within a range of 1.60-1.82 and predominantly favor a felsic composition with intermediate-to-high silica content of the rocks.

A major intra-crustal (18-27 km), slightly westward dipping (~4.3°) interface with high Vs (~4 km/s) underneath is prominent in the central HC, continuing in the eastern Vijayan Complex (VC). The dipping discontinuity and a low velocity zone in the central Highlands can be related to the HC/VC contact zone and is in agreement with a well-established amalgamation hypothesis of a stepwise collision of the arc fragments, including deep crustal thrusting processes and a transpressional regime along the suture between the HC and VC.