Teleseismic Converted Waves Image of the Indo-Burma Subduction System Across the Bangladesh-India-Myanmar (BIMA) Array

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Recent GPS studies show that the Indo-Burma subduction system is locked with the implication of a potential large-magnitude earthquake. To inform better seismic hazard models in the region, we need an improved understanding of the crustal structure and the dynamics of the Indo-Burma subduction system. The Bangladesh-India-Myanmar (BIMA) tripartite project deployed 60 broadband seismometers across the subduction system and have been continuously recording data for ~2 years. In this study, we computed receiver functions from 30 high-quality earthquakes ($M \geq 5.9$) with epicentral distances between 30º and 90º recorded by the array. The algorithm utilized ensures the uniqueness of the seismic model and provides an uncertainty estimate of every converted wave amplitude.-We stacked all the receiver functions produced at each station along the entire transect to generate a cross-sectional model of the average crustal structure. The level of detail in the image is improved by computing higher frequency receiver functions up to 4 Hz. The results represent some of the strongest constraints on crustal structure across the subduction system.

Beneath the Neogene accretionary prism's outer belt, we observe a primary conversion associated with the Ganges Brahmaputra Delta that ranges in depth from ~10 km near the deformation front up to ~12 km at the eastern boundary. From the eastern end of the Neogene accretionary prism to the Sagaing Fault, we image the Indian subducting slab and the Central Myanmar basin. The depth-extent of seismicity associated with the Wadati-Benioff zone is consistent with the locations of primary conversions from the subducting plate. We further verify the converted phases of the slab by analyzing azimuthal moveout variations. The Central Myanmar basin is roughly bowl-shaped in cross-section with a maximum thickness of ~15 km about halfway between the Kabaw and Sagaing faults. The average crustal thickness beneath the Ganges-Brahmaputra delta is ~20 km, most likely representing a transitional crust formed from thinning of the continental crust intruded and underplated by igneous rocks. In contrast, the average thickness of the continental crust beneath the Central Myanmar basin is ~40 km. Our results provide a baseline model for future geophysical investigations of the Indo-Burma subduction zone.