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S-wave velocity structure and radial anisotropy in the Qinghai-Tibet Plateau

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Some 700 earthquakes with magnitude Ms $\geq$ 5.0 and focal depth mainly $<$ 100 km, which were recorded between 1980 and 2002 by 13 digital broadband seismic stations belonging to national and international networks installed in and around the Tibetan Plateau, were considered for this study. All these events generated fundamental mode Rayleigh and Love waves whose vertical and horizontal components were corrected for instrument response and their respective traces reduced to ground motion. Using frequency-time analysis we obtained group velocity dispersion curves for more than 1,500 Rayleigh and 1,450 Love great-circle source-receiver paths and periods ranging from 10.4 to 95.3 s. After inverting the path-averaged group times by means of a tomographic method and applying a stochastic scheme, we have constructed SV- and SH-wave velocity maps for Rayleigh and Love waves at ten typical intermediate periods. The tomographic images of the Qinghai-Tibet Plateau have substantially high lateral resolution because of the dense and more or less uniform short-path coverage, and they permit to investigate the relationship with the main tectonic structures. Testing of the velocity patterns shows significant variations as laterally as with depth revealing the lithospheric root and leading edge, and the complexities of the subducted lithosphere and the effects of the subduction of the Indian Plate beneath the Eurasian Plate. The strength and spatial extent of percentage radial anisotropy is computed from the Love-Rayleigh discrepancy at several depths, thus constraining the deformational style and flow in the regional crust and mantle.