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Surface Wave Dispersion Analysis in the Eastern Ghats Mobile Belts and Adjacent Archean Cratons and its implications on Lithospheric Velocity Models

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The dispersion curve characteristics for the surface waves are examined to investigate the crustal and upper mantle structural variations in the Eastern Ghats Mobile Belt and the adjacent Archean cratons using 147 regional earthquakes (Mw $\geq$4.0, 300-1100km) recorded at 27 broadband seismic stations installed in our study area. The Multiple Filter Technique (MFT) is implemented on the fundamental mode of the surface waves in the period range 4-100 s, to estimate the group velocities. The Rayleigh and Love wave dispersion data are then jointly inverted to estimate the shear wave velocities along different azimuthal paths with respect to our deployed stations. The data is categorized into five broad zones based on their azimuthal variations encompassing earthquakes originating from the Indo-Burmese ranges, Northeastern Himalayas and Shillong plateau, Sikkim-Bhutan, Nepal Himalayas, and the southern Indian shield. The seismic waves traversing through different geological features across the five broad zones are significantly reflected through variations in the dispersion curves. The seismic waves originating in central Nepal crossing over the Indo Gangetic Plain register low velocity ($\sim$2.33 km/s) for periods lesser than 10s at all the stations owing to the thick sedimentary deposits along the path traversed, while the paths across the Indian Shield registers higher group velocities ($\sim$2.9 km/s). Dispersion analysis in the periods range 4-60 s, exhibits Rayleigh wave group velocities within 2.07 km/s to 4.53 km/s at all stations. Among the installed 27 stations, the stations situated in the Archean cratons exhibits a higher near-surface shear wave velocity (3.3 km/s) as compared to stations placed in the Rengali Province and Mahanadi Rifts along the same path. Our results represent complex velocity structures across the distinct profiles, which is possibly an implication of the various phases of rifting and collision prevalent during the Grenville and Pan-African age.