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Direct S-wave derived seismic anisotropy beneath Eastern Ghats Mobile Belt and adjacent Archean cratons: Signature of collision and rifting

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The present study examines direct S-wave derived seismic anisotropy beneath Eastern Ghats Mobile Belts (EGMB) and adjacent archean Singhbhum and Bastar cratons to investigate the signature of the various phases of collision and rifting of the Eastern Ghats and Rayner block of East Antarctica. This study adds new constraints on the seismic anisotropic scenario of the region and tends to fill the back-azimuthal coverage gaps that left in the previous SKS splitting measurements. The Ref- erence Station Technique (RST) is employed to isolate the receiver-side anisotropy. A total of 408 well-constrained splitting measurements are obtained using 112 events (Mw $\geq$5.5) within an epicentral distance of 30 to 90 degree recorded at 27 deployed seismic stations. Comparison of direct-S wave derived splitting measurements (present study) with previous SKS measure- ments show a similar pattern, although some discrepancies exist where hitherto no or few SKS splitting measurements were obtained. Those stations are now supplemented with new measurements with well-constrained anisotropic signatures. Most of the splitting delay time is greater than 1 s (0.99–1.69 s), which is suggestive of highly anisotropic lithospheric mantle. FPDs are predominantly along the Absolute Plate Motion (APM) direction for most of the stations. However, some stations along the EGMB-craton boundary and southeastern part of Eastern Ghats Province (north of Chilka lake region) show major devi- ation from the APM trend. Apparent correlation of direct-S splitting parameters with previous SKS measurements, absolute plate motion (APM) directions and satellite gravity and magnetic measurements are manifestations of the frozen lithospheric deformations and asthenospheric dynamics. The frozen lithospheric deformations are signature from the Grenvillian (0.9–1.0 Ga) and Pan African (0.5–0.6 Ga) episodes of rifting and collision of India and East Antarctica.