

10

Lithosphere Asthenosphere Boundary Beneath the Peninsular India

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The base of the lithosphere or the lithosphere asthenosphere boundary (LAB) is characterized by the presence of partial melt. Such an interphase between high electric resistivity lithosphere overlying the low resistivity partial melt is a well determined layer with distinct signatures in the magnetotelluric (MT) responses and thus can be delineated with a high degree of precision. Studies over the central part of the Deccan protocontinent have delineated low resistivity layers at depth ranging between 80 and 150 km, indicating a thin lithosphere. There are very few geophysical studies which can probe the asthenospheric depths. Apart from the MT studies the seismic tomography also provides information on the lithospheric thickness, through the low velocity anomaly caused by the partial melt at the LAB. The recent studies using the receiver function analysis of the seismic tomographic data have reported several negative anomalies in p-wave velocities corresponding to this layer. Comparison of these results with the low resistivities observed from MT studies show some correlation between the low resistivity and low p-wave velocity anomalies, although significant mismatch exists. Perhaps the studies on the mantle xenoliths could provide useful inputs towards understanding the observed mismatch. Another prominent feature is a thin long low resistivity feature running NW-SE along the west coast at depth of about 50 to 150 km, extending over a distance of about 600 km between Goa and Nasik. This is also indicated in the form of a low p-wave velocity anomaly in the receiver function data. The causative factors behind this anomaly in the lithospheric mantle will be discussed in this talk.