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OBS Derived Crustal Model of the Central Indian Ocean Basin

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The study of the deep structure beneath the deformation zone is the most important task in the northern Central Indian Ocean Basin (CIOB), which could explain the origin of the intraplate deformation. The data acquired by five Ocean Bottom Seismometers (OBS) along a 300 km long South-North profile in the CIOB have been modelled using two dimensional (2D) ray tracing technique. A five layered model of the crustal and upper mantle structure of CIOB has been derived using 2D tomographic inversion. The analysis of the acquired OBS refraction and wide-angle reflection data have provided model of the entire crust in an area where other seismic techniques have been not so successful with relatively large uncertainties, specifically the imaging of the sub-sedimentary part of the crust is concerned. The sediments are characterized by an increase in velocity due to increased confining pressure. The velocity variation in the crust indicates the lateral change in lithology. The low velocity in the upper part crust (5.66 km/s) suggests the typical nature of the crust due to interaction of upper and lower crustal layers by differential stress regimes in CIOB. In most part of the study area the velocity of the lower crust varies from 7.0-7.6 km/s. This high-velocity layer is interpreted as a magmatic under plated body with strong lateral variations. The base of the 7.0 km/s layer at 12-15 km depth is interpreted as the Moho, and the upper mantle velocity is estimated as 8.9 km/s. The paper presents the new findings including unresolved upper mantel layer characteristics.

Keywords: Ocean Bottom Seismometer (OBS); Central Indian Ocean Basin (CIOB); and Crustal Structure.