AOGS 2005

Crustal Velocity Structure of the Narmada-Son Lineament along the Thuadara-Sendhwa-Sindad Profile in the NW part of Central India and its Geodynamic Implications

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A five-layered crustal model with 5.9-6.2, 6.0, 6.3, 6.6 and 7.0 km s-1 velocities is derived with seismic refraction / wide-angle reflection data along the Thuadara-Sendhwa-Sindad profile in central India. The profile traverses across the western part of the Narmada-Son lineament in the N-S direction. The data is subjected to 2-D forward modelling using both travel times and amplitudes. Refracted waves (P_n) from the Moho observed as first arrivals at a distance of about 200 km are used to derive the upper mantle velocity of 8.1 km s^{-1}. The Moho is well constrained both from the P_n and wide-angle reflections from four shot points. The main features of the velocity structure is the delineation of a low velocity layer (6.0 km s^{-1}) in the upper crust and a 12-16 km thick high velocity (7.0 km s^{-1}) layer at the base of the crust. The high velocity lower crustal layer, representing the magmatic underplating in the region, may be related to the formation of the Narmada basin and the Deccan volcanic episode. The Deccan Volcanism may be a consequence of mantle plume activity. The crustal thickness varies between 37 and 43 km along the profile and the thickest crust is found between the Narmada and Tapti rivers. The gravity model constrained from the seismic velocity structure corroborates the crustal structure. Deep-seated faults responsible for the evolution of Narmada basin are inferred from the present study.

Keywords: Underplating; Deccan Volcanism; Narmada-Son lineament; wide-angle reflection; moho.