

Modern Approaches in Solid Earth Sciences

Ashoka G. Dessai

The Lithosphere Beneath the Indian Shield

A Geodynamic Perspective

 Springer

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AUTHORS and AFFILIATIONS

Department of Earth Science, Goa University, Taleigao Plateau, India

Ashoka G. Dessai

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Ashoka G. Dessai

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Abstract

The Indian shield displays considerable variation in lithosphere composition and architecture not only among cratons but even intra-cratons. The Aravalli Craton has a transparent upper crust (av ~ 20 km) with variable thickness, averaging about 20 km. The Moho occurs at about 40 km. The crust in the Bundelkhand region is ~40 km thick, but reduces to 8–15 km at the continental margin. The lower crust consists of plagioclase-poor mafic granulites and eclogites under- and intra-plated by pyroxenites/websterites which are expressed by strong seismic reflectors. In the south, in Bastar Craton the lower crust is strongly interlayered by ultramafic- and mafic-lithologies.

The WDC crust in the mid-latitudes (Kelsi-Loni) is differentiated into three velocity layers with a fairly well-developed mid-crustal horizon (~12–26 km). The lower crust consists of layered and isotropic, plagioclase-poor, mafic granulites along with eclogites. These coexist with plagioclase-rich felsic granulites and are under- and intra-plated by spinel lherzolites and harzburgites/dunites.

The velocity structure of the EDC is not much different from that of the WDC except that the lower crust beneath this region shows strong westward dipping reflectors. These indicate distinct mafic layering due to the presence of eclogites, an abundant lithology in the SCLM of this region.

In the SGT, the broad velocity picture is identical to that observed in the E-W transects across the cratons to the north except that a relatively low-velocity zone (V_p : 6.5–7.0 km/s; 5–10 km) is sandwiched between 12 and 22 km.

Offshore, both in the west and east, the upper continental crust is missing. Oceanic sediments and volcanic rocks are directly underlain by layers of V_p : 6.2 and 7.2 km/s possibly of mafic granulites. The layer beneath with velocity 7.6–8.0 km/s is also conspicuous by its absence.

