

Seismic imaging of the signatures of mantle plume and collisional zone in and around Cuddapah Basin, South Indian Shield

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Introduction

Cuddapah Basin and its surrounding areas of the south Indian shield have been associated with intense 1.1 Ga kimberlitic magmatism and collisional features associated with India-Antarctica interaction. In spite of many geological and geophysical investigations, the crustal structure and nature of geodynamic evolution of this region have been little understood. In view of this, we have reprocessed the Deep Seismic Sounding (DSS) data acquired across this region, which covers all the prominent geotectonic segments [1]. For this purpose, we have modelled the first arrival refraction and wide angle reflection travel time data. This study provides a detail seismic image of the underlying crust and throws a new light on its geotectonic evolution.

Significant Results

The derived seismic crustal structure differs significantly across this region. The southwestern part of the Cuddapah basin (near Parnapalle) is found to be associated with the signatures of a deep seated late Proterozoic mantle thermal anomaly, possibly resulting from a mantle plume. Beneath this region, upwarping of high velocity and high-density layers, shallowing close to the surface, have been observed. This region appears to have been underplated by a thick (15 – 20 km) high velocity magma layer above the Moho, delineated around 44km depth. Similarly on the eastern side of this basin, the delineated crustal structure depicts thrusting upwards of the shallow to mid crustal layers, beneath the Nellore Khammam Schist Belt. This feature conforms to a paleo-continental collision. This region is also associated with an unprecedented (20 – 25 km) thick magma layer (V_p : 7.0 - 7.3 km/s) above the Moho lying at a depth of 45 km.

[1] Kaila *et al* (1979) *J. Geological Society of India* **20**, 307-333