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Deep Structure of the Indian Continent

Satish Maurya (1), Jean-paul Montagner (1), Ravi Kumar (2), Prakash Kumar (2), and Gael Burgos (1)
(1) Institut de Physique du Globe de Paris, (2) National Geophysical Research Institute

The Indian sub-continent experienced remarkable tectonic and geological events. Breakup of Indian subcontinent from the Gondwana supercontinent possibly due to a large plume, about 130 Myr ago. Paleomagnetic data demonstrates that the Indian continent moved northwards from 65Myr at exceptionally high speeds (18-20cm/year) and subsequently slowed down to 4-5cm/year after its collision with Asia approx 40Myr ago. This super mobility has been explained by an unusually thin Indian lithosphere ($\sim$100 km; Kumar et al., 2007) in contradiction with the thick lithosphere that commonly underlies old cratonic nuclei. It is pertinent to note that the thermobarometric estimates on the ultramafic xenoliths from a 65Myr kimberlites of the Central India (Babu et al. 2009) suggest an approximately 175 km thick lithosphere. Also, analysis of heat flow data and P-T estimates on mantle xenoliths from the Dharwar craton reveal low mantle heat flow, 14-20 mW m-2, that indicate a thick lithosphere beneath south India (Roy and Mareschal, 2011). Upper mantle heterogeneities and depth localization of anisotropy structures beneath India are poorly known. In order to solve these issues, we have to follow a multidisciplinary approach to investigate the lithospheric and asthenospheric structure underneath the Indian cratons and the Indian plate. Seismological studies (receiver functions, SKS splitting, anisotropic and surface waves studies of the Indian continent) in conjunction with heat flow, petrological and paleomagnetic data planning to be utilized to image and interpret the 3D-tomographic velocity and anisotropic structure of the whole continent and trace its evolution through time. In this work, we present the high resolution phase velocity maps with azimuthal anisotropy of fundamental and higher mode surface waves propagating across India.