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Imaging Sub-Volcanic Sediments From Wide-Angle Seismic Data In Selected Basins Of India

Kalachand Sain[1]

[1]CSIR-National Geophysical Research Institute, Uppal Road, Hyderabad - 500007

ABSTRACT

Since the era of exploring oil/gas at ease is almost over, industry looks forward for the exploration of hydrocarbons in difficult terrains such as the thrust fold belt or the sub-volcanic Mesozoic sediments in which more than 50% of oil has been found globally. However, a vast tract of western-central India and its margin has been covered by Deccan volcanic rocks that have made standard geophysical techniques incapable of probing Mesozoic sediments hidden underneath due to their inherent limitations. We have provided a solution to this challenge by wide-angle seismic experiment, and delineated large-wavelength velocity structure in the Kutch, Saurashtra and Tapti basins onland using traveltime tomography of wide-angle seismic data. But, these models lack in delineating fine structures or stratigraphic horizons within the sediments. It is the computationally intensive full-waveform inversion (FWI) that can exploit the entire components (traveltime, amplitude, frequency, phase etc) of seismic data and provide finer details of the subsurface. We shall demonstrate the application of FWI to both the theoretical and field seismic data in the Kutch and Kerala-Konkan offshore. We have observed that for successful FWI, we need a very good starting model, preferably the traveltime tomography model, and the inversion should be carried out from very a low frequency upward.