Paper Number: 296

# AEROMAGNETIC AND GRAVITY STUDIES FOR EVOLUTION OF DEEP CRUSTAL CONFIGURATION OF SAURASHTRA-CAMBAY BASIN-DECCAN LARGE IGNEOUS PROVINCE, INDIA -

**S.Srinivas**, Lok Nath Singh, Preeti Wagh, NK Vinoda, Mridula Chauhan and Vinod Kumar
Remote Sensing and Aerial Surveys, Vasudha Bhavan, Geological Survey of India, Bengaluru-560 078.
e-mail: srinivas.somanchi@rediffmail.com

The Indian Plate after being separated from Seychells around Cretaceous (~85-90 Ma) drifted further north and subsequent eruption of flood basalts in the form of a Deccan Large Igneous Province (~65 Ma) thereby masked the basement consisting of Archean Greenstone belts, Proterozoic Sedimentary basins and other basement features in the Central, Southern and Western India around 1000 km in radius centred by the Plume bead of the Deccan Continental flood basalt region. The Saurashtra-Cambay basin forms the north western periphery of the flood basalts of Deccan Volcanism, in which the Trap are exposed in the Saurashtra Peninsula lying over the Mesozoic sediments while in the Cambay basin these are covered by Quaternary and Tertiary sediments, enriched with oil and gas.

Potential field data in the form of high altitude aeromagnetic and regional ground gravity data provide the deep-seated crustal / moho information and heterogeneity of the basement. These data sets were interpreted covering the Saurashtra-Cambay basin and the adjoining continental shelf portion in the present study. The aeromagnetic and gravity data is analysed in the form of Analytic Signal for the contact, Spectral analysis to know the depth of the causative sources and Low-Pass filtering, Euler 3D solution and basement configuration to delineate the deep seated features and crustal configuration.

The Cambay basin is indicated in the aeromagnetic and gravity images as a prominent north-south trending domain with the clear demarcation of east and west boundary faults of the basin. An alternate sequence of graben-ridge structures representing of basement features possibly extending depth wise and demarcating Cambay basin in the offshore areas over the Gulf of Khambat are the salient inferences of the area.

The aeromagnetic and gravity images over Saurashtra Peninsula demarcated the region into four domains viz., Central, Western, East-West and Southern domains. The Central and Southern domains are not contaminated at depth by basic material during Deccan volcanism related activity whereas the Western and East-West domains have deep seated structures in E-W, NE-SW direction and facilitated for the emplacement of Deccan Trap flood basalt to exhume in the Saurashtra Peninsula. The geometry of exposed volcanic vents at Barda, Alech, Junagarh, Chogat and Chamardi in the East-West domain were delineated by this study and further identified concealed volcanic vents at Jambusar and Jamnagar. The aeromagnetic image of the offshore area demarcated the extension of ENE-WSW trending Narmada-Son Geo fracture into the Arabian Sea, West Coast Fault System in the form of ridges and trenches and Kachchh lineament forming the NW boundary of Saurashtra Peninsula. A two-layered crustal model based on 2.5D gravity modelling along three profiles with density parameter and constrained by drill hole and Deep Seismic Sounding data reveal an average thickness of 1.5-2.0 km for the Deccan Trap and

the underlying thick Mesozoic sediments of 4-5 km in the Saurashtra region and the Tertiary and Quaternary sediments of Cambay basin of about 5 km.

The deep crustal configuration representing the upper and lower crust varies from 10 to 18 km depth and moho undulation at 31 to 42 km across the Saurashtra Peninsula and Cambay basin. Few basic bodies at lower crustal level and shallow moho depth corroborated by structures extending deeper level have facilitated for the magma upliftment from the mantle during Deccan Volcanism.

Theme: Fundamental Geoscience / The Deep Earth
Key Words: Deccan Volcanism, Aeromagnetic, Gravity, Saurashtra, Crustal Structure, India