Role of Deccan Volcanism in Crustal Structure and Tectonics of Bay of Bengal

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ABSTRACT

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The integration of available gravity, magnetic and seismic data on crustal structure, tectonics, volcanics and evolutionary characteristics, when evaluated in the light of the role of magmatism in the part of Bay of Bengal upto 85°E longitude, suggests that Deccan Volcanism(67-60Ma) related magmatic underplating and intrusives as well as both pre & post magmatic uplift has played a major role towards the modification in nature of crust and related tectonics affecting the tectono-sedimentation. Owing to the presence of this younger volcanic as Ferro-tholeiite dykes of similar age (65.4 Ma) reported in the Rajmahal Traps, large onland area of Krishna-Godavari basin and in few drilled wells of Mahanadi and Cauvery basins, it may be quite possible that the large areas of east coast and Bay of Bengal may also be covered with this late Cretaceous/Paleocene Deccan flood basalts in the subsurface along pre-existing highs or earlier weaker zones.

The present day 85°E ridge which is an isolated volcanic feature in Bay of Bengal, might be linked with these younger volcanic through a failed rift in the extended continental crust and be reconstructed close to Mahanadi basin where a prominent N-S trending older fracture zone has been identified by many workers. This suggests that intense eruption through the northern part of the present day major 86°E fracture zone might have resulted the so called 85°E ridge volcanic in the Indian Ocean only after late Cretaceous. This younger event might be considered to cause a significant pre- and post magmatic uplift of the lithosphere along the East Coast margin and adjoining areas. Both the underplating and substantial post-Deccan uplift have been documented through the seismic signatures and structural modelling along 85°E ridge complex. These evidences of crustal uplift/magmatic underplating as well as younger volcanic activity are arguments which favour the involvement of Deccan related volcanic episodes for the formation of 85° E related feature.

This volcanic event has significant bearing on crustal uplift along east coast margins creating gravity and magnetic anomalies over the onland and offshore areas. Besides, this has also recognizable effects on the sedimentation due to changed eastward regional as well as local drainage pattern, shoaling, thinning of strata over the uplifted area and erosional unconformity between the basalts and underlying stratigraphic sequence. It is envisaged that this volcanic activity created strong variation in geothermal gradients affecting the process of hydrocarbon generation in East Coast basins.

Note: Authors are employed in KDMIPE, ONGC and solely responsible for opinions presented in the paper