The Late Paleocene palaeogeography and palaeolandscape of India

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The Late Paleocene is a time when the Indian Plate was surrounded by relatively large expanses of ocean on all sides, and was widely separated from other large continental blocks. Represented by a post rift period of slowly subsiding passive continental margin along both the east and west coasts, the Late Paleocene is an important time for both reservoir and source rock development.

The Late Paleocene palaeogeography map of India comprise mapping, in ArcGIS, of palaeoenvironments, palaeolithologies and palaeodrainage. This provides a spatial context for representing and investigating the past distribution of these elements, which are critical for the understanding the evolution of play elements through time. It is also a powerful predictive tool for extending interpretations beyond the extent of existing data (e.g. wells, outcrop), and for providing explorationists with a visual link between tectonics and source to sink relationships (the distribution of accommodation space and sediment source areas).

The resultant timeslice demonstrates the landscape evolution during the Late Paleocene and is depicted by two major regimes: Depositional systems - whether subsequently preserved or eroded. These can be further subdivided into respective environment (e.g. deep marine, fluvial, lacustrine etc.); and Non-depositional systems - These are areas of net erosion. These again can be further subdivided into tectono-physiographic terrains and their relative age to the timeslice (e.g. Convergent, divergent, hot-spot plume etc.). Conceptually, these two systems are separated by a base level which equate to an equilibrium between net erosion and net deposition.

The reconstruction of palaeotopography and palaeodrainage for the Late Paleocene comprises a variety of techniques that link an understanding of the underlying tectonics with landscape evolution. The actual logistics of topographic reconstruction in GIS follow two paths: plate reconstruction of the modern elevational grid, which is then manipulated through time; and the generation of contours for each timeslice, which are then combined with the reconstructed palaeorivers and lake distributions to generate palaeo-DEMs. The outcome of both methods is a grid, which can be more easily manipulated. The latter method is used primarily in order that the mapping can take better account of the geological history represented by the reconstruction of tectonophysiographic terrains and depositional polygons. The advantage of a palaeo-DEM over a traditional palaeotopographic map is that it integrates the drainage and topography to generate a ‘hydrologically-correct’ grid (i.e. the depicted palaeodrainage network is consistent with the reconstructed topography) when represented by grid cells.