Tectonic Evolution of Andaman Basin with Special Reference to Hydrocarbon Potential

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Abstract

Andaman Basin forms part of a large geo-tectonic unit that extends from Sumatra (Indonesia) Islands in south to Myanmar (Burma) in north. Major tectonic events - subduction/oblique subduction, magmatic intrusion and backarc spreading, led to the development of various sub basins viz. trench basin, fore arc basin, intra volcanic arc basin, and back-arc basin. Most of the drilled wells in Andaman Basin lies in fore arc setting and only one well in Back arc. Till date total 22 wells have been drilled in this basin, out of which only few non-commercial hydrocarbon discoveries are reported from Middle Miocene carbonate and Pliocene clastics. The objective of current study is evaluation of hydrocarbon potential and structural evolution of the basin with especial attention on hydrocarbon potential. For the same, regional maps (Time and depth) for all major stratigraphic sequences have been prepared in the study area. Each tectonic unit within the basin shows, unique structural evolution i.e. accretionary prism has three thrusted units form late Eocene onward with multiple detachments within basement. Outer rise shows a pronounced uplift due to ophiolite intrusive complex. The outer fore arc comprises of westward verging thrust faults with lesser deformation as of accretionary prism. Inner fore arc is characterized by growth fault related sedimentation with inverted structures in Neogene. Intra volcanic lows have extensional faults and inversion structures. The back arc is characterized by typical extensional set up within Oligocene and Central Andaman Basin has rifts from Late Miocene onwards. Prospective locales have been identified in fore arc and back arc basin by integrating available G&G data along with current tectonic understanding (interpretation). Additionally, PSM along 2D section passing along the prospective areas in fore arc has been carried out.

Which show immature sediments in fore arc, due to low heat flow in accreted crust, leads to absence of thermogenic petroleum system in the region. Sedimentation rate in Pliocene is very high (~1200m/Ma), which is favourable for Biogenic gas generation. The study concludes that fore arc has biogenic potential in the identified prospects. PSM study of back arc setting, shows higher heat flow that lead complete transformation of speculative sources. The generation of biogenic gases were fast and rapid before the formation of suitable overburden for accumulation. High Geothermal gradient in back arc setting due to crustal thinning provides suitable condition for thermogenic hydrocarbon generation. The hydrocarbon potential and element of petroleum systems of back arc setting will get verified and reinforced with the drilling of prospects for delineation of future exploration targets.