Tectonic Evolution of Andaman Inner Forearc Basin and its Implication in Hydrocarbon Exploration.

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Based on the newly acquired 3D seismic data and integration of this data with existing well data and 2D seismic data in the inner fore arc part of Andaman Oceanic Island Arc system, two phases of evolution, accretionary prism phase (upper Cretaceous to Oligocene) and forearc phase (Early Miocene to Recent) have been proposed for the Andaman Inner Forearc basin situated on SE Asian region of Eurasian plate.

In the accretionary prism phase, most of the sediments are trapped in the trench and are involved in the process of accretion onto the overriding plate which eventually leads to an outerarc formation towards the close of Oligocene. This phase is characterised by complex thrusting and folding towards the trench side and normal faultingand associated deformation towards the volcanic front side responsible for the large structural trap formation in the area. In this phase, a thick prism of sediment containing good source rock (Eocene) and potential reservoir rock (Oligocene turbidite) has been identified in the area around present day deepwater. This source and reservoir combination constitute the first speculative petroleum sysyem, i.e, Paleogene-Paleogene (!) in the basin with the critical moment for oil towards the close of Mid Miocene and make the paleogene as the prime target. These sediments have been deposited in the deep water setting in the form of pelagite and turbidite with input from Sibumasu continental mass for the lower part of prism (upper Cretaceous to Eocene) and from Bengal fan and Irrawady delta for the upper part of prism (Oligocene). The study envisages short distance and vertical migration in this phase. The migration remains a critical risk for the propects in this phase.

In the forearc phase, most of the sediments are trapped in the arc-trench gap. This phase has been divided into two stages, i.e, ponded fill stage(Miocene) and sag fill stage(Post-Miocene).

Ponded fill stage is inundated by a number of tectonic events and dominantly by a turbidite fill and mudflow deposits.The ponded fill stage is started with an extensional event leading to half graben formation on sedimentary sequence of previous phase and compartmentalisation of forearc basin. This was followed by a quiescent period when carbonate sedimentation in shallow water to outer shelf has taken place and then two compressional events, one towards close of Mid Miocene and other towards the close of Miocene leading to inverted structures and thin skin thrust-fold belt. In this stage, two important reservoirs (carbonate and clastic) in Miocene and one potential source rock have been deposited. With the reservoirs and source rocks of this phase and previous phase, two more petroleum system,i.e.,Paleogene-Neogene (.) and Neogene-Neogene(!) have been identified. The study also envisages short distance and vertical migration in this stage. The Neogene source rock has just entered in the early phase of oil window in the area of study. Therefore, the Mid Miocene carbonate with charge from Paleogene source rock is considered as the primary target and Mid Miocene clastics are considered as the secondary target in the area with reservoir as well as charge as the critical risk.

Sagfill stage is characterised by the passive fill of the basin with pelagite and has little hydrocarbon potential.

Andaman forearc basin has hydrocarbon potential in Paleogene and Miocene sequences with hydrocarbon charge as the critical risk in accretionary prism phase and both charge and reservoiras the critical risk in fore arc phase. Prospects overlying the kitchen holds more promises than the prospect

away from kitchen. Probable kitchen area in the forearc is located around the present day deepwater area. Therefore, prospects close to the present day deep water are worth probing.

Although the viability of the fore arc area as a hydrocarbon province remains dependent upon the factors that can be confirmed only by drilling well, the shear size of the structural traps, envisaged stratigraphy and disposition within the basinal framework are sufficient to mean that the area VIII is perhaps one of the most attractive candidates for exploration of thermogenic play in the Andaman fore arc irrespective of first well results in the area.