

Hydrocarbon Exploration Prospect of Girujan Clay Formation of North Assam Shelf: A Case Study of Geocellular Modeling of Lakwa Area
Das, Debashis ¹; Akhter, Shamim ¹; Roymoulik, Sujit K. ¹; Singh, Harvinderjit ¹ (1) ONGCL, India, KDMIPE, Dehradun, India.

Hydrocarbon find in Girujan Clay Formation of Miocene of North Assam Shelf Basin reveals an important dimension towards the hydrocarbon exploration in shallower horizon. The challenge here is the exploration of discrete sand bodies (5-10m thickness) within an overall shaley sequence. These fine grained sand bodies being very thin and discontinuous in nature and identification of them being practically impossible in seismic, well logs remain the main tool for exploration in this sequence. The log motifs of the sands of Girujan sequence of the wells reveal channels and bar/crevasse splay sands but their lateral extent are difficult to predict from seismic. In this study 3D Geocellular modeling for lithology, depositional environment and porosity have been attempted in the 3D seismic volume of Girujan of Lakwa area of North Assam Shelf by taking seeds from the well logs and upscaling them. The nature and extension of the sand bodies three dimensionally are understood.

Based on seismic correlation, Girujan could be divided into two major time units viz. the lower and Upper units in the North Assam Shelf. The well log correlations, well cross section with seismic backdrop also support this division. Girujan attains a thickness of around 700m in Lakwa area and pinches out towards west in Rudrasagar and Disangmukh area. 3D geocellular modeling of lithology and environment of deposition of Lakwa area brings out a channel, bar system in an alluvial fan setup. Girujan in Lakwa area represent the distal part of the alluvial fan, whereas its proximal part lies in further northeastern part of the basin. The porosity modeling reveals that shale porosity ranges from 30-35% in this area whereas, sand porosity varies from 20- 30%.

As per established Petroleum system of this area, Barail Coal Shale (BCS) Fm. below are the main source rocks for the hydrocarbons entrapped in Tipam, Girujan and younger sequences. The hydrocarbon generated in the BCS is migrated upward through the faults to charge the Tipam and Girujan fms. above. Breaching of top seal of Tipam and diffusion are evidently the main fairway of Hydrocarbon, especially gas to the Girujan Fm. The channel/bar sands, within the Girujan Fm., are the main reservoir for hydrocarbon. There may be some component of lateral migration also as sometimes hydrocarbon occur in non-fault related sands. In Girujan, the migration is mainly fault related, whereas the entrapment is largely stratigraphic.