Structural Style of the Assam Shelf and Schuppen Belt, A &AA Basin, India

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The Naga Thrust Belt is a narrow, elongated zone of imbricate thrusts about 20 to 35 km wide, extending for about 200 km in a NE-SW direction. It constitutes the outermost morpho-tectonic unit of the Assam-Arakan fold belt formed as a result of subduction of the Indian Plate beneath the Burmese Plate. The main axis of compression is SE-NW, with the oldest Disang Thrust of Late Eocene-Oligocene age. Thrusting continued up to Late Pliocene; the youngest emergent thrust is the Naga Thrust, which separates the foreland and the imbricate thrust zone. The structural evolution of the Naga Imbricate Thrust Belt is not well understood due to poor seismic imaging, few well data and abrupt variations in the stratigraphy across the foreland and Schuppen Belt and within the imbricate belt itself. To these problems we can add the lack of geological data in the inaccessible terrain to the east of the Disang Thrust upto the Indo-Burman border.Earlier works have brought out models ranging from thin-skinned tectonics with movement along thrust planes merging in a basal thrust propagating westward to pure thick-skinned tectonics. Modelling using MOVE – 2D software of Midland Valley indicated that simple thick or thin skinned models do not adequately explain the structural features observable within the Naga Thrust Belt.

A geological model that considers inversion along pre-existing (pre-Oligocene) extensional faults and development of thrust splays due to continued compression from the SE, however, could explain the present configuration. In this study we present a model involving combination of extensional features, later inversion along older normal faults and thrusting. The construction of a a balanced cross-section in the north-central part of the Naga Thrust Belt (Geleki) gives a fairly representative figure for shortening of about 25%.

The main hydrocarbon producing structures within the foreland are mostly located adjacent to the Naga Thrust. It is anticipated that these reservoirs extend below the Naga Thrust, perhaps upto the Disang Thrust. Extension of existing petroleum system(s) of the Shelf under the Schuppen is then postulated, with the Kopili and Barail source rocks attaining maturity during late Miocene and Pliocene with increased burial. Traps are not expected to be encountered in the overthrust sheets due to lack of a well developed cap rock, poor lithological characteristics and reactivation of faults upto the synorogenic erosion surface resulting in breaching of anticlines. The present work followed by petroleum systems modelling has led to a more realistic prospectivity perception of the area. Modelling by the TECLINK module of PETROMOD software suggests that the subthrust part of the imbricate thrust zone seems to be a prolific source and kitchen from the Kopili shales and the Barails for the generation of hydrocarbons, which then migrated during the Pliocene period through faults, thrusts and permeable pathways into structural and strati-structural traps already present in the foreland.