Tectono-Sedimentation Model and Hydrocarbon Potential of Gondwana Sediments in Pranhita Godavari and Krishna Godavari Basins, India

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Gondwana sediments in the study area are confined within a NW-SE trending linear trough called Pranhita Godavari (PG) graben, also known to extend underneath the later formed Krishna Godavari (KG) basin, India.

Detailed geological and geophysical analysis brought out an episodic tectonic model for these sediments. The first stage of heating and rifting, initiated during Early Permian, resulted in to the formation of Pranhita Godavari graben. Second rifting was associated with the continental break up of Gondwanaland (Early Jurassic) and continued upto Early Cretaceous (Neocomian). As a result the transverse Krishna Godavari basin, one of the several Indian coastal Gondwana basins, formed with northeast-southwesterly oriented depocenters of syn-rift sediments. The impact of block movement and upliftment during Jurassic rifting along the rift shoulder caused inversion within Jurassic (Gollapalli Sandstone) and underlying sediments. During drifting stage (Aptian) thermal cooling and associated isostatic upliftment in the continental part resulted in pronounced southeasterly tilt and reversed the course of fluvial system towards SE, which is followed by widespread marine transgression in KG basin.

The sedimentary fill of Permo-Carboniferous to Late Triassic period is mainly of fluvial origin. Whereas, Gollapalli Sandstone was deposited at a close proximity of the provenance under fluvial to shallow marine environment.

Barakar Coal-Shale facies of Lower Gondwana sequence is the only matured source rock in the area. As a result of superposed basin tectonics it has been proved to source both Triassic and Late Jurassic reservoirs in PG and KG basins. Hydrocarbon entrapment is controlled by the superimposed fault pattern (older, NW-SE and younger, NE-SW) resulted by episodic rifting.