Delineation of Basement Related Fault Closures in Eastern Part of Purnea Basin Based on Morphotectonic Analysis

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The Purnea basin is a polycyclic rift basin located in the eastern part of Indo-Gangetic plain in Bihar and West Bengal continuing further eastwards to the Bangladesh border and beyond. Tectonically it could be classified as an intracratonic rift basin with an approximate thickness of about 4000m of sediments ranging in age from Permo-Carboniferous to Recent. The basin is bounded and separated from the Ganga Basin in the west by Monghyr Saharsa ridge whereas in the east it is bounded by the Kishanganj Fault. The south and northern extents of the basin are bounded by the Malda High and Main Boundary fault respectively (Bhowmik, 2009). Geochemical data from the four drilled wells in Purnea Basin indicate that Lower Gondwana sequence has generated hydrocarbons whereas a recent gas discovery in Salbanhat, Bangladesh close to the Indo-Bangladesh border also suggests that the equivalent sediments would be prospective in this part. The arenaceous facies in Upper and Lower Gondwana act as suitable reservoir rocks whereas presence of clay/ shale beds in Gondwanas and Siwaliks may act as suitable cap rocks. As such fault closures of Basement related faults, pinch outs and wedge outs in Lower Gondwana sequence can acts as interesting elements for exploration. These sub surface structures might be manifested as subtle geomorphic features on the surface as a result of reactivation due to prevalent neotectonic stresses. In this paper an attempt had been made to identify such morphotectonic elements in order to identify probable structures of exploratory interest and also to provide input for refinement of the existing geological model. The morphotectonic analysis has been carried mainly on the basis of drainage, followed by field check to validate them. The study area is confined to the West Bengal part of the Purnea Basin bounded on the west by the Mahananda River, in the north by Kishanganj Fault, in south by Rajmahal Fault and the east by Atrai River.