

Kolhan Sedimentation in Chamakpur-Keonjhar Basin, Orissa, Eastern India

Linashree Dalabehera

(Thesis to be submitted to the Indian Institute of Technology, Kharagpur
for the award of Ph. D. degree in Science)

Abstract

The fluvial styles recorded in the Paleoproterozoic Kolhan sediments of eastern India in the Chamakpur-Keonjhar basin reflect variations in the rate of generated accommodation space. Six lithofacies arranged, in two genetic sequences, have been recognized within the succession. The lower sequence records little available accommodation space with a high degree of reworking, which resulted in sheet-like, high-energy, bed load-dominated, braided fluvial deposits that lacked recurrent facies patterns. Channel deposits in the lower sequence reflect mixed-load, braided fluvial systems on stable channel banks with a low-moderate gradient. The channels retained an overall braided character with no evidence of meandering, despite indications that large fluctuations in discharge occurred within the mixed-load streams. The swift response of the fluvial systems resulted from rapid runoff rates caused by the absence of vegetation.

As accommodation space increased upwards, the rate of reworking of the sediments was reduced, and fining and thickening-upward sandstone-shale sequences formed. This led to the formation of alternating sheet sandstones and sand-streaked siltstone-shale. The sheet sandstones record evidence of high-energy, unconfined ephemeral fluvial flash-flood deposition, internal erosion, and growth surfaces, while the shale-siltstone are interpreted to represent sand flat deposits.

The Kolhans represent more than a single phase of deposition and the internal erosion surfaces are indicative of channel avulsions. Variations in the style and order of the bedding contacts show that the deposits are products of subaqueous dune, bar, and channel migration. The paleo-river had high width:depth ratio.

The change in fluvial style combined with local evidence of desiccation suggests an evolution towards a more semi-humid climate in the upper sequence in contrast to a warm humid climate in the lower sequence. This climatic change could account for the reduced bed-load input seen in the overlying succession, which culminated in the ephemeral deposition style.

Provenance studies indicate a dual source of the sediments : Singhbhum granite and the Iron Ore Group of rocks.

Keywords: Kolhan sedimentation, lithofacies sequences, braided fluvial deposits, ephemeral deposition, accommodation space