

Channel Deviation and incision of River Sabarmati, Gujarat Alluvial Plains, India.

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Sabarmati river in north Gujarat flows dominantly through Semi-arid region (mean annual rainfall ~650mm). Emerging from Aravalli hills near Marwar, it drains vast alluvial plains before debauching into the Gulf of Cambay. Regional stratigraphy based on sub-surface data show nearly 300m thick Quaternary sediments resting over Tertiary basement (Biswas, 1987; Maurya et al., 1995; Tandon et al., 1996). These sediments have been attributed to the past super fluvial system existed during the Quaternary (Sridhar et al., 1994). The palaeo drainage of the region followed a SW flow transacts as reflected by rivers like Banas, Saraswati and Rupen. It was suggested that Rupen represent the palaeo course of Sabarmati, which deviated from its regional slope during the late Quaternary. Cambay basin, which runs NNW-SSE, appears to have a significant influence in drainage evolution and the deposition of Quaternary sediments (Biswas, 1982, 1987). Numerous NNE-SSW trending fractures have developed consequent to the formation of Cambay graben which caused the readjustment of Sabarmati to its present day N-S course. Since the river cut through the Quaternary deposits it is inferred that the incision might have followed after its adjustment to the present course.

Exposed Quaternary sequences in the Gujarat alluvial plains show the dominance of fluvial regime during their deposition. The section along river Sabarmati indicates that the deposition commenced with sandy, gravelly beds followed by silty sandy fluvial deposits towards the top. This silty sandy deposit is identified as Upper fluvial sequence, which is overlain by dunal sand.

In the present study we have used the Luminescence dating technique to constrain the timing of river adjustment and its subsequent incision. Attempt has been

made to ascertain the causative factor responsible for the river incision particularly the role of tectonics and climate change.

Luminescence dating of the upper fluvial sequence indicate that the fluvial activity dwindled after 30ka, this is followed by the aeolian accretion after a hiatus around 12ka. Following the deposition of the upper dunal sand, river started incising the sediment, which is continued till date. The incision was initiated after 12ka and >5ka. We find that river adjustment might have taken place due to the tectonics in the upper catchment of the river, where as the river incision is dominated by the onset of SW monsoon in the region. Geomorphological evidence obtained from the scroll plains of the river indicate the two major episodes of tectonism which are dated to around 5 ka and 3ka.