

Paper Number: 432

Geomorphological evolution of Satluj valley in the climatic sensitive tract between Rampur and Luhree, Himachal Himalaya, India during Late Quaternary

Mujtaba, S.A.I.¹, Saini, H.S¹ and Bhattacharya, S.¹

¹Suptdg. Geologist, Geological Survey of India, NH-5P, NIT, Faridabad, Haryana, India
saimujtaba57@gmail.com

¹Director (Ret.), Geological Survey of India, NH-5P, NIT, Faridabad, Haryana, India

¹Sr. Geologist, Geological Survey of India, DGCO, Delhi, India

The Quaternary geological and Geomorphological studies in middle reaches of Satluj valley in Himachal Pradesh was undertaken to develop regional morpho-stratigraphy of sedimentary sequences with the help of OSL dating. Upstream of Rampur (between 900 and > 2000 m elevation), the valley is narrow and straight, gradient is high and terraces are insignificant. In the downstream the valley is wider, meandering and has well at least five levels of terraces (T_1 to T_5) and three types of debris deposits can be differentiated. Lithological composition at different places revealed that the major detritus in the Satluj had come from the local rocks and best terrace formation has taken place at the confluence of subsidiary drainage. In all, three major phases of valley filling have been recognized since ca 70 ka.

The earliest record of valley filling occur at 200-400m above the modern river bed in the form of alluvial fans and debris flow deposited ca. 69 ± 5 to 64 ± 6 ka. No significant terrace formation occurred during this phase. A major phase of valley filling took place during ca. 49 ± 3 to 33 ± 3 ka during the MIS 3 interstadial. It filled the valley up to a height of 100 m by gravelly-bouldery sediments derived mainly from the surrounding rocks. The homogenous nature of sediments fill suggests a steady and rapid aggradation of valley under high intensity rains which mobilized large detritus from the surrounding catchment areas. The high-energy river deposition suggests high water supply in the river, which can be inferred in terms of the strengthening of southwest monsoon. This is the main period when monsoon were strong and climate was semiarid as indicated by the predominance of gravel and general absence of clays in terrace deposits.

It was followed by a sequence of grey sandy terraces located near Datnagar and Bithal. In contrast to the gravelly sequence, it represents a low energy stream disposition. Grey fine sand suggests that the material was derived from higher Himalayan source and has travelled long distance. Such kind of sedimentation can be envisaged under modest stream energy, when rainfall was not heavy and the glacial melt could mobilize fine grained sediments from higher reaches. The OSL age at the base of this sequence suggests its deposition commenced around 30-15 ka in the ending phase of interstadial MIS 3 and terminated during the last glacial maximum (LGM) when aridity became more conspicuous. It seems the incision of the gravelly and sandy fills took place in the last 15 ka. The youngest pulse of sedimentation in Satluj valley occurred during 2.4-1.8 ka.

