**Abstract**

In the NW Himalaya, Late Quaternary sedimentary deposits along glacial fed Yamuna River
offers an opportunity to understand the feedback mechanism of Glacial-Interglacial cycles to
ISM dynamics and resultant fluvial development since MIS-5a (Interglacial). Fluvial terraces and
alluvial fans contributes to major landforms along River valley from Higher Himalaya (source
area) to Sub-Himalayan and comprises of ~10m upto ~180m thick gravel deposit carved into
distinct terrace levels (T-1 to T-7; order of increasing height from modern Yamuna R.). In the
present work, the geomorphological and sedimentological studies and OSL based absolute
chronology of these deposits constraints multiple phases (Phase-I to IV) of sediment dispersal
and accretion in the pre-existing valley punctuated by shorter incision periods. In the narrow
upper reaches of the valley (near present glacier) and in the middle reach (Lakhamandal area),
oldest fluvial aggradation (Phase-I) recorded during &gt;83ka to ~80ka (MIS-5a) represented by
distinct patches of fluvial deposits (T-7). This older aggradation indicative of limited glacial
advance and fluvial (meltwater) sediment transport and deposition of gravel facies followed by
incision. Phase-II aggradation continued around ~50ka to ~41ka coincides with MIS-3 (Inter-
glacial stage) warm and humid climatic condition and preserved as remnant patch of fluvial
deposits (T-6) followed by rapid incision owing to lower sediment: water ratio. During ~37ka
upto ~23ka, major sediment accretion phase (Phase-III) is recorded in the wider parts of valley
(between MBT and MCT) in the form of ~120m thick clast supported fluvial gravel. This phase
coincides with transitional MIS-3 &amp; MIS-2 (Interglacial-Glacial transition). The sedimentary
facies, accretion geometry suggests deposition under braided river environment. Glacier retreat
and release of sediment might have responsible for such extensive aggradation under more
sediment water ratio and less sediment transporting capacity of Yamuna River. The aggradation
phase is carved into distinct degradational terrace levels (T-3 to T-5). Another younger
aggradation phase (Phase-IV) represented by discontinuous terrace deposits (T-1 and T-2) is
recorded across MCT. The Late Quaternary sedimentary archives in the valley across MCT and
correlation of aggradation and incision phases are well correlates with Indian Summer
Monsoon (ISM) dynamics (δ 18 O record), and profound control of glacial-interglacial cycles since
MIS-5a.