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interstratified clay minerals in loess-paleosols and polygenetic soils of the himalayan foreland: a record of late quaternary enhanced monsoon precipitation

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Present study demonstrates genesis and transformation of interstratified clay minerals in accretionary loess-paleosols of Kangra re-entrant, NW Himalayas (79-22ka) and polygenetic soils of Gangetic Plains (<13.5 ka). Enhanced monsoon precipitation increased weathering rates and neoformation/transformation of clay minerals during the pedogenesis of the Himalayan foreland sediments during Late Quaternary. Well-drained and slightly acidic ferruginous loess-paleosols of the NW Himalayas are marked by the predominant interstratification of Chloritised Vermiculite-Kaolin (Vm/K) and interstratified Smectite-Kaolin (Sm/K) in polygenetic soils of the Gangetic Plains that are neutral to slightly alkaline and moderately to poorly drained in nature. Interstratification of Vm/K and Sm/K is attributed to the weathering of Biotite during the increased rainfall but slightly different pedogenic environments in NW Himalaya and Gangetic Plains.

During the pedogenesis of loess in NW Himalayas biotite first weathered to Chloritised Vermiculite in cold-arid climate and became unstable during subsequent high rainfall and acidic conditions and transformed to interstratified Vm/K towards the formation of 7A (Kaolin) minerals. In Gangetic Plains, pedogenesis is marked by the weathering of biotite to vermiculite and smectite during arid to semi arid conditions and the unstable smectite during subsequent humid conditions transformed to Sm/K. Hydroxy interlayering in vermiculites commonly observed in acidic loess-paleosols of NW Himalayas possibly prevented the formation of smectite from biotite weather-

ing as recorded in polygenetic soils of the Gangetic Plains. Interstratified Vm/K and Sm/K can be regarded as last product of high rainfall during changing climate that had significant impact on weathering and soils formation the Himalayan foreland during Late Quaternary.