

Abstract

Intensity of Indian summer monsoon in terms of wind induced upwelling is well recorded for the late Quaternary period. However, reconstruction of rainfall amount variations associated with the monsoon is scanty. Change in monsoonal rainfall intensity should have substantial effect on vegetation as well as river response. Thus, four cores from the central Ganga Plain (GP) i.e., Kalpi (KP), Bhognipur (BP), IITK and Firozpur (FP), lying on the SW monsoon trajectory have been sampled for soil carbonate (SC) and paleosols (PS) spanning last 100 ka. The ^{18}O variation in SC suggests that the monsoon intensified at ~100, ~40 and ~25 ka and noticeably lowered (~20%) at ~18 ka corresponding to the Last Glacial Maxima (LGM). The ^{13}C variation in SC implies change in relative abundance of mixed $\text{C}_3\text{-C}_4$ vegetation on the GP during the last 100 ka was driven mainly by monsoonal rainfall variation. Variations in carbon concentration and ^{13}C in residual organic matter (OM) dispersed in PS and trapped within the SC nodule at same depth imply selective preservation of OM. Molecular (n-alkanes and fatty acid) abundance and isotopic analysis (fatty acid) indicates that the PS OM contains contribution from mixture of sources including vascular plants, algae and microorganisms. Strontium isotope ratio of SC shows that the Ganga River is characterized by high $^{87}\text{Sr}/^{86}\text{Sr}$ ratios than the global average rivers in past and present. The $^{87}\text{Sr}/^{86}\text{Sr}$ ratio of both SC and silicate and Nd record from FP core suggest that low precipitation and high glacial cover over the higher Himalaya causes less sediments supply from it and enhanced sediments supply from the lesser Himalaya during LGM. On the other hand, interfluvial area (IITK core) record water-sediments interaction within the alluvium during last 100 ka. $^{87}\text{Sr}/^{86}\text{Sr}$ and Nd possibly suggest that the modern Yamuna course is relatively older (~80 ka) than previously it was thought. The synchronicity of activation of thrust and changes in source of sediments ~45 ka onwards support a dominant control of tectonics on erosion and weathering pattern apart from widely believed role of climate in the GP.

Key words: Ganga Plain; Monsoonal rainfall; isotopic ratio; $\text{C}_3\text{-C}_4$ plants; late Quaternary; Soil carbonate.