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NEWS AND NOTES

The Last Glacial Maximum to Holocene Palaeoenvironment of the Kashmir Valley, Western Himalayas

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The Kashmir Valley is an elongated depression of about 140 km long and up to 60 km wide with an average elevation of 1800masl. It is located between latitudes 34°17'N and 37°6'N and longitudes 73°6'E to 80°30'E. The valley basin was developed in northwestern India during the late Cenozoic era by tectonic uplift of the Pir Panjal Range, which impounded the drainage of Himalayan side and gave rise to a vast lake, known as "Karewa Lake" (Singh 1982; Bhatt 1982). The lake was drained through the Baramulla due to the continuous uplifting of the Pir Panjal Range (Godwin-Austen 1859). The sediments deposited in the lake are about 1300m in thickness, known as Quaternary sediments of Karewa Group. The Karewa sediments are generally fluvio-lacustrine in nature and are draped by loess palaeosols deposits and these represent the prominent climatic fluctuation since the Late Quaternary period. The Kashmir Valley was under the influence of the South-West monsoon between ~4.4 to 1.95 Ma and experienced warm and temperate climate (Basavaiah et al., 2010). However, rapid tectonic uplift of Pir Panjal ranges prevented South-West monsoon from entering into the valley and thus only mid-latitude Westerly disturbances influenced the climate of the region, subsequently. The Kashmir Valley observed substantial glacial advance during the Last Glacial Maximum (LGM). The LGM (~25000 yr BP) was the most recent stage of the Last Glacial Period during which ice sheets were at their greatest extent. While, the Holocene Epoch started at around 11700 yr BP marking the end of the Pleistocene Epoch. This phase witnessed climate shift from extreme cold LGM to warm interglacial (Holocene), and it significantly influenced the geomorphology of the earth's surface and evolution of flora and fauna in it. The Holocene Epoch was characterized by the commencement of noticeable rapid deglaciation. However, cyclic dry/cold climate events tentatively linked to climate fluctuations due to North Atlantic ice rafting, known as Bond events have also been reported in Northern hemisphere during this epoch.

We studied multiple sites in Kashmir Valley during the last seven years to understandthe evolution of the LGM to Holocene paleo-climate. Our observations have revealed the occurrence of cold/dry climate from 29 to 20 ka, that peaked at around 26 to 24 ka (LGM stage). The proxy records revealed the continuous climatic amelioration from 20 to 12 ka. The lacustrine records of the Holocene Epoch from the Kashmir Valley provide signatures of dry/cold climate phases that correspond to the Bond events 0, 3, 4, 5, and 7. This indicates a Westerly-dominated climate during the Holocene Epoch. The sedimentary process revealed strong anthropogenic influence due to forest land clearing and agriculture extension during the last 2 ka and similar observations were also revealed from the black carbon (BC) concentration data of the lake sediments. The observations reveal that the region has been profoundly influenced by westerly disturbance during the entire Holocene.

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