Climatic and Topographic Control over Quaternary Glacial Sediment Preservation in Miyar Basin, NW Himalaya, India

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ABSTRACT

The Chandrabhaga basin in the Higher Himalayan Lahaul region experiences a transitionary climatic regime due to the unique juxtaposition of the Indian Summer Monsoon (ISM) and the Mid Latitude Westerly (MLW) systems amidst rugged high altitude topography of the Western Himalaya (Das, 2023). The Great Himalayan range acts as a final barrier to the ISM bringing in summer precipitation; the region also constitutes as the southernmost periphery of MLW which causes precipitation in the winter months. Complicated micro-climatic characters and the presence of ample evidences of the quaternary glacial past, provides an open laboratory for chronological reconstruction.
In our preliminary investigation and analysis using Optically Stimulated Luminescence (OSL) and Terrestrial Cosmogenic Nuclide (TCN) techniques for constraining ages of palaeo-landform records from the Upper Chandrabhaga basin; it emerges that the climatic gradient with reference to these two weather systems along with terrain factors, have limited the existence of sampling materials through removal due to later periglacial and paraglacial processes. Nature of moisture supply from either systems, and snow-melt/ice-melt have re-sedimented and largely altered these Quaternary deposits. Quite evidently, in our study area, reworking of previously deposited materials have remained rapid in a high energy environment.
On the semi arid northern side of Pir Panjal, within the Miyar catchment of Chandrabhaga basin, landform records indicate of the presence of a bygone trunk Miyar glacier till about 45 km from the current glacier snout. Much of the bulk of this large trunk glacier was added by erstwhile glacial mass of tributary glaciers debouching onto the Miyar glacier throughout its length up-to 2800m asl (Sharma, 2022). The presence of tens of meters of thick lacustrine fill at Gumba, 15 km away from the present Miyar glacier snout, points towards a blockade that the Thanpatan-Gumba-Chaturdhani glaciers may have collectively caused to the Miyar Nala in the past. Maximum and minimum OSL ages of the lacustrine sediment section, derived through Double-Single Aliquot Regenerative protocol, were 33 and 6 ka respectively. The study provides an insight into the rate of glacier recession since previously undated gigantic Miyar Stage (LLGM), using samples from identified fragmentary moraine deposits on the precipitous trunk valley slopes. Through geomorphic evidences, we discuss the bearing that climate and topography holds with respect to extents of oldest glaciations in the three major sub-basins of Lahaul, i.e. Chandra, Bhaga and Miyar, constituting a probable glacial event chronology for the entire upper catchment area of the Chandrabhaga basin.

REFERENCES

Sharma, M. C., Manna, I. and Chakraborty, E., 2022. Contemporary dynamics and Holocene extent of glaciers in the Himalayas. In Holocene Climate Change and Environment. Elsevier, 33-61.

Das, S., Murari, M.K., Sharma, M.C., Saini, R., Jaiswal, M.K., Kumar, P.V., Kumar, P., 2023. Reconstraining the Quaternary glacial history of Lahaul Himalaya, northern India. Quaternary Science Reviews, 316:108258.