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The Padum relict lake System, Zanskar, India: a study to understand provenance andthe climatic implications

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The Padum (PZ) relict lake in the Zanskar Range offers a natural experiment for tracing how Quaternary climate forcing and tectonics modulate Earthsurface processes. Glacial advances from the Seni catchment repeatedly delivered large ice volumes to the trunk Zanskar valley, constructing moraine belts and thick outwash bodies that reorganised sediment routing from the Greater Himalayas to the Indus valley. Deglaciation during the early–mid Holocene (10.8–6.5 ka) promoted incision of these outwash plains, thereby creating an alluvialfan dammed lake, whose laminated silty–clay rhythmites and sand bodies record alternations between proglacial lacustrine deposition, hyperpycnal inflow, and fan progradation under a strengthening Indian Summer Monsoon and mid-latitude westerlies. Clay minerals of PZ (illite–chlorite dominance with minor smectite/kaolinite) point to low–tointermediate weathering intensities in a highrelief, cold, arid to semi-arid setting. The CIA value, like clay minerals, is consistent with only incipient to intermediate alteration of ferromagnesian minerals and feldspars. The Harker plot show loss of Ca–Fe–Mg–Ti-bearing mafic minerals and feldspars and relative enrichment of quartz and clay during weathering. In La–Th–Sc ternary plot the PZ samples fall in the felsic–intermediate uppercrustal field. Multielement UCC normalised plots show that PZ patterns closely relates to the average upper continental crust and regional Zanskar–Greater Himalayan lithologies, indicating erosion of typical felsic to intermediate uppercrustal sources with only minor compositional fractionation. Similar conclusion can be drawn from REE normalised plots, depicting smooth LREEenriched patterns and minimal PAAS-UCC deviations, indicating a homogenised, typical felsic
uppercrustal provenance.