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GEOSITE

Tectonic and climatic forcing on the rivers in Pamir

The high mountains of Pamir provide a fascinating natural laboratory to study geodynamic processes and their surface feedbacks. The ongoing India–Asia convergence controls the topographic growth, while the transition from westerlies to Indian summer monsoon-driven climate sets the pace for erosion processes. The role of climatic and tectonic factors is especially well recorded by the Pamir Rivers that reflect considerable changes in discharge and base levels and corresponding reorganization of the drainage network. In particular at the Pamir Plateau, the intercalation of glacial and fluvial sediments and massive landslides witnesses the complex interaction of surface

Fig. 1 Lake Yashilkul is dammed by one of the biggest landslides of the Pamir Plateau. The enormous landslide volume blocks the valley at the western lake outlet with its frontal lobe reaching up the opposite valley slope. The resulting natural dam forces the discharge from the plateau to retain until exceeding the dammed valley's storage capacity and being released towards the western plateau margin. The inflow is controlled by the Alichur River draining the central part of the dry Pamir Plateau and by minor rivers of the mountain ranges south and north of Yashilkul that are partly glaciated. At the western outlet, the Gunt River links the plateau discharge to the powerful Panj River system. Moraines highlight Late Quaternary glaciations down to the lake shoreline, while the former valley floor is hidden beneath the present lake level. Hot springs and a geyser further attest for seismic activity in the region

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Fig. 2 Wide plateau valley of the eastern Pamir Plateau marble region, nearby the wind gap between the Alichur Valley and the Murgab Valley. The river is relatively small compared to the plateau characteristic wide and flat valley. Low riverbed slopes and the low discharge due to the dry climate, especially at the eastern plateau, limit river incision and cause a meandering river course. Fluvial erosion is controlled basically by lateral abrasion. Several terrace levels indicate past changes in fluvial dynamic and suggest variations in paleoclimate and/or drainage reorganization due to local base-level changes

processes in high mountains. We present two figures of characteristic valleys at the Pamir Plateau to describe the complex interaction of surface processes and climatic versus tectonic control factors (Figs. 1, 2).