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Age of the Keylong Serai rock avalanche, NW Indian Himalaya

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We report on the occurrence and age of a major rock avalanche on the north slope of the High Himalaya in northern Himachal Pradesh.

Rock avalanches (sturzstroms) are a major slope failure hazard within high mountain areas. Many are reported from the Karakoram Himalaya, but little is known of those in the Indian Himalaya. Rock avalanches commonly have long run-out distances relative to the volume of their source areas. In plan form, their lobate structure is much influenced by the topography of the overwhelmed landscape. They have a clast-supported surface cover of large angular rock fragments that preserve the original lithostratigraphy of the source. They also are characterised by an internal structure of isolated boulders supported by a matrix of powder that shows increased shattering or fragmentation with depth. The process of fragmentation contributes an internal dispersive force leading to greater spreading and runout.

At Keylong Serai in the upper Yunan valley that lies just north of the Baralacha La, $>12 km^2$of valley floor is covered in large angular blocks that overlie a much finer, matrix-supported diamict. The geology of the area exposes south dipping quartzites, micaceous schists, with dolomite clasts and metagreywackes of Precambrian-Palaeozoic age. The structure is complex and linked with a major backthrust associated with the Zanskar Normal Fault. The southern flank of one mountain has failed as a major rock avalanche that started as a major rock slide leaving a scarp face of >1000m. On impacting the valley floor, the rockslide transformed into a series

of lobes in excess of 3km in length, travelling over 250m up the opposite valley slope and forming a coarse-grained deposit $>$100m thick.

Cosmogenic ^{10}Be surface-exposure dating of 3 quartz samples from stable surface boulders at around 5000 m altitude gives an error-weighted mean age of 7510 $\pm$ 110 calendar years BP, at 1 standard error of the mean. An OSL date for deglaciation from down valley of 10.2 $\pm$ 2.1 ka BP indicates that the avalanche occurred after deglaciation, in association with changes in slope stresses or due to undercutting of the slope. An immediate seismic trigger is probable.