Large-scale bedrock landslides in Japanese Alps: an implication to the influence of climate change in shaping mountainous landscapes

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Several recent heavy rainfall events in Japan reveal the sensitive nature of deep-seated landslide occurrence to rainfall anomaly, which invokes potential influence of both of natural and anthropogenic climate change on such catastrophic mass movements in mountainous terrains. A combination of river incision under long-term tectonic activity and episodic deep-seated landsliding by climate forcing may progress the mountainous landscape evolution. The present study attempts to verify the role of climate change in shaping the mountainous landscapes by dating of paleo bedrock landslides using terrestrial cosmogenic nuclide ^{10}Be in Japanese Alps. Samples for exposure dating were collected from top of a boulder on landslide deposits or bare rock slip surface exposed since the landslide. Effect of snow shielding on nuclide production were corrected for accurate determination of exposure ages, and the correction procedure was calibrated by ^{14}C dating for some deposits yielded by the identical landslide event. The ages of landslide deposits concentrated in Holocene epoch especially at just after the Termination I (transition from the last glacial to present interglacial stage) and also recent period during the last 3 kyr. These results imply that climate change has potentially instigated the landslide occurrence and thus contributed to form and maintain bedrock dominated steep topography adjacent to incised valleys in mountainous ranges.

Keywords: deep-seated bedrock landslide, exposure dating, river incision, glacial-interglacial cycles, quasi dynamic equilibrium, landscape evolution

