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Title:	Imminent threat of rock-ice avalanches in High Mountain Asia
Authors:	Yunus, Ali P. (/jspui/browse?type=author&value=Yunus%2C+Ali+P.)
Keywords:	2021 Chamoli rock-ice avalanche Deformation history
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Citation:	Science of the Total Environment, 836(1), 155380.
Abstract:	Upsurge of glacier-related hazards in High Mountain Asia (HMA) has been evident in recent years due to global warming. While many glacial-related hazards are instantaneous, some large landslides were preceded by slow gravitational deformation, which can be predicted to evade catastrophes. Here, we present robust evidence of historical deformation in 2021 Chamoli rock-ice avalanche of Himalaya using space imaging techniques. Multi-temporal satellite data provide evidence of a precursor event in 2016 and expansion of a linear fracture along joint planes, indicating 2021 rock-ice avalanche is a retrogressive wedge failure. The deformation history shows that the fracture propagated at a velocity of ~ 0.07 m day ⁻¹ until September 2020, and with an accelerated velocity (~ 0.14 m day ⁻¹ on average) lately. Analysis of recent similar cases in HMA supported our inference on global warming-induced glacier retreat and thermomechanical effects in enhancing the weakening of fractured rock masses in tectonically active mountain belts. Recent advances in Earth observation and seismic monitoring system can offer clues to the location and timing of impending catastrophic failures in high mountain regions.
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