

## Can earthquakes trigger delayed snow avalanches?

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Strong earthquakes often trigger snow avalanches, sometimes with observable delays, which existing models cannot explain. Resolving this shortcoming is critical for improving safety, as emphasized by deadly delayed avalanches in Western Himalaya and, most recently, by the devastating Rigopiano avalanche in Italy's Abruzzo region, which occurred more than 30 min after the last in a series of major quakes on 18 January 2017. This work establishes the basic mechanism of delays in earthquake-induced avalanche release using a novel analytical model that yields failure scenarios consistent with the Western Himalaya and Rigopiano cases. The mechanism arises from the interplay between viscoelastic relaxation, strain softening and strain-rate sensitivity of snow, which drive the growth of a basal shear fracture. Our results imply that milder slopes are prone to longer delays, indicating that existing safety and evacuation concepts for such areas may have to be revised.