

Seismological Analysis of Hazardous Mass Movements and Their Cascades



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Approximately 12% of the global population resides in mountainous regions that are highly vulnerable to hazardous mass movements and their cascading effects. Effective management of geological hazards requires a deep understanding of the complex physical mechanisms driving these events and their interactions. Recent advancements have demonstrated that seismometers can provide real-time data on geomorphic processes and hazards, even from remote locations. Here, I will present my research on utilizing seismic signals to investigate the dynamics of two common types of mass movements—landslides and debris flows—and their cascades. While hazard cascades triggered by earthquakes are typically conceptualized as linear chains, such as the sequence of earthquake-landslide-dammed lake-outburst flood, our findings further suggest that landslide-dammed lakes can, in turn, trigger earthquakes. These results emphasize the potential of seismological techniques not only for studying mass movements but also for offering new insights into the bidirectional interactions between earthquakes and mass movement processes.



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