Why use seismology to study landslides and debris flows?

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Landslides and debris flows generate seismic signals that contain valuable information about the event as it unfolds. The incorporation of seismic analysis into more traditional investigations of surface mass movements can add a new dimension to our understanding of event dynamics and the hazards these events pose. However, successfully harnessing the seismic wavefield to make scientific advances requires that we understand what information is actually contained in the observed wavefield and also that we have the means to reliably extract it. Though this subdiscipline of seismology is only a few decades old, the research community has already made strides in establishing the theory, models, and methods required to use seismology to make quantitative observations, but outstanding challenges remain. I will review the progress that has been made, giving particular focus to what we are learning from 1) large-scale seismic experiments at the USGS debris flow flume and 2) multidisciplinary studies of impactful landslide sequences in which seismic analysis is just one of many tools in a diverse toolkit. I will also discuss bigger picture motivations for the pursuit of landslide seismology, such as the search for reliable precursors and early warning systems. I will end with a discussion of how I have incorporated aspects of landslide seismology into GeoGirls, a geology and technology fieldcamp for middle school girls at Mount St. Helens.