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Properties of earthquake and rainfall -triggered landslides

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We study the properties of earthquake-triggered landslides and rainfall-induced landslides. This study is carried out through analysis of four datasets of landslides mapped in California, Papua-New Guinea, Taiwan and New Zealand. The two first cases correspond to landslides triggered by major seismic events (1994, Northridge and 1993, Finisterre), the Taiwan dataset gathers 3 collections of landslides induced by a succession Typhoon-Earthquake-Typhoon and the last dataset contains rainfall-induced landslides which occurred along the Southern Alps (New Zealand) thrust fault over the last 50 years. We show that the co-seismic landslide density exponentially decreases from the epicenter over a distance roughly corresponding to the ground acceleration decay. Moreover, the distribution of landslide location along the slope strongly depends on both triggering event and climate. Thus, earthquake-induced landslides under a dry climate (California) tend to occur close to the ridges while rainfall-triggered ones in sub-tropical regions (New Zealand) tend to be more uniformly located over the slopes. This can be explained by the increase of shaking intensity combined with the decrease in pore pressure near the ridges. Finally, the combination of a major seismic event and a typhoon in Taiwan, resulting in a huge amount of material being removed from the belt over a short period, suggests that strong earthquakes in wet areas may not create topography.