



The constant struggle between earthflows and rivers in northern California

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Earthflows might be slow moving landslides (velocities average ~ 1 m/yr) but they dominate hillslope erosion in many regions of weak, mélangé geology around the world, including in the northern Californian Coast Range. Recent research also suggests that they have a significant influence on river channel and wider landscape evolution through the delivery of large boulders that act to protect the channel bed from incision. Inhibition of incision by boulders has been shown by field and modelling studies to result in steeper channels and therefore relationships between erosion rate and channel steepness index that differ substantially from those predicted by stream power models and found in other basins. Furthermore, the negative feedback of boulders on channel incision and hillslope erosion may explain the survival of relief in mountain ranges.

Here, we present new results on the role of earthflows in landscape evolution, with a focus on the grain size distribution of boulders delivered to channels by earthflows, their influence on channel morphology and finally on wider landscape evolution in northern California. Results suggest that earthflows modify the grain size distribution delivered to river channels from hillslopes; that earthflows may temporarily wipe out lower order channels from the landscape, reducing drainage density and that, where channels survive, there is a direct relationship between the grain size distribution of channel bed boulder cover (delivered by earthflows) and catchment erosion rates.