

# Measuring the forces generated by erosive debris flows

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Like water flows, debris flows can carve out steep valleys and change landscapes. By studying the mechanics of bedrock incision caused by flowing debris, scientists are better able to understand patterns and rates of landscape evolution. Laboratory studies and models have shown how flowing granular materials can cut into rock, but field measurements are needed to confirm the findings and provide information about the more complex natural environment.

Monitoring a natural debris flow environment, McCoy et al. measured approximately 30-60 millimeters (1.2 to 2.4 inches) of bedrock lowering over a 4-year period. They observed the mechanisms by which the bedrock was removed by passing debris flows and analyzed the characteristics of several erosive debris flow events, focusing on the basal normal force—the downward force on the [bedrock](#) exerted by the flowing debris—which fluctuated substantially during the events due to particles entrained in the flow impacting the bed.

They also find that a [thin layer](#) of bed sediment can shield the bed from the impact of erosive particles. The findings, which allow the researchers to place constraints on the forces involved in the erosion process, show that debris flows are an important driver of landscape change.

**More information:** Field measurement of basal forces generated by erosive debris flows, *Journal of Geophysical Research-Earth Surface*, [doi:10.1002/jgrf.20041](https://doi.org/10.1002/jgrf.20041) , 2013 [onlinelibrary.wiley.com/doi/10.1002/jgrf.20041/abstract](http://onlinelibrary.wiley.com/doi/10.1002/jgrf.20041/abstract)

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