Geophysical Research Abstracts
Vol. 17, EGU2015-1444, 2015
EGU General Assembly 2015

Conceptualizing hillslope sediment connectivity as virtual velocity

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The extent and speed of sediment delivery from catchment hillslopes to stream channels are products of the connectivity between the two. This relationship has often been expressed in terms of sediment sources and sinks. Here we reconceptualize the relationship as an expression of the virtual velocity (distance of travel per unit of time including periods when the particle is at rest) of eroded soil particles. This conceptualization has the advantage of being employable over a range of temporal and spatial scales and is applicable to any process, or combination of processes, of sediment transport operating on a hillslope. In this study we apply the conceptualization to examine hillslope connectivity of interrill erosion at three temporal scales. We use data from plot experiments to determine the virtual velocity of soil particles at the scale of a single event, at the scale of a season of runoff events, and at the decadal scale. These data allow us to infer what proportions of the hillslopes are supplying interrill sediment at these temporal scales.