



Soil formation in response to perturbed erosion rates

Simon Mudd (1), David Milodowski (1), Kyungsoo Yoo (2), Emmanuel Gabet (3), Beth Weinman (4), Mikael Attal (1), and Fiona Clubb (1)

(1) University of Edinburgh, GeoSciences, Edinburgh, United Kingdom, (2) University of Minnesota, Department of Soil, Water and Climate, (3) San Jose State University, Department of Geology, (4) California State University, Fresno

Time is recognized as one of the soil forming factors. In upland, sloping landscapes time is controlled by erosion rates. These erosion rates may be forced by climate, tectonics, and increasingly anthropogenic disturbance. Perturbations to erosion rates alter the exposure of near surface material to both physical and chemical weathering, which can influence water retention, plant growth and sediment transport. All of these can feed back into further perturbation of erosion rates. Here we present field data, topographic analysis and numerical modelling from a field site in the Sierra Nevada of California where we have attempted to examine soil formation across a range of erosion rates, and determine their influence on soil particle size, geochemistry and plant life, as well as the geomorphic signature of overland flow. Erosion rates have strong impact on soils, leading to coarser soils that support less biomass when erosion rates are high and clay rich soils with higher biomass when erosion rates are low. Erosion rates also appear to influence the dissection of the landscape by channels, which we quantify using high resolution topographic analysis.