



Climate change has limited impact on soil-mantled landsliding

Robert Parker (1), Tristram Hales (1), Simon Mudd (2), and Stuart Grieve (2)

(1) School of Earth and Ocean Science, Cardiff University, Cardiff, United Kingdom

(parkerr5@cf.ac.uk, halest@cardiff.ac.uk), (2) School of Geosciences, University of Edinburgh, United Kingdom
(smudd@staffmail.ed.ac.uk, s.grieve@ed.ac.uk)

Projected increases in future storminess, associated with anthropogenically-driven climate change, are expected to produce an increase in landslide frequency and hazards. This prediction relies on an implicit and poorly tested assumption, that landslide frequency is limited by the effectiveness of landslide triggers (pore-pressure events determined by the intensity and duration of storms). Using an unprecedented field dataset of hillslope soil depths and ages (attained through radiocarbon dating) from the Southern Appalachian Mountains (USA), we show that this assumption is not valid in this landscape. Instead, landslide frequency is limited by rates of soil production and transport processes, which prepare sites for future landsliding. By simulating the evolution of Appalachian hillslopes, we demonstrate that unless climate change can drive an increase in soil production and transport rates, an increase in future storminess will have little effect on long-term landslide frequency, while individual storms will trigger fewer and smaller landslides.