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Influence of Rainfall on Hillslope Movement

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Cased boreholes on the Redwood Creak basin in northwestern California were surveyed semiannually by inclinometer from 1974 to 1982. Regressions were calculated between borehole displacement and an antecedent precipitation index (API) variable. Values for the API variable were obtained by summing daily API values over the time between borehole surveys, if the daily API value exceeded some threshold. The coefficient of determination, r^2 , was maximized by calculating a series of regressions with various API recession factors and thresholds. The "best" regressions had a recession factor of 0.99 and a zero threshold. Results suggest creep and earthflow rates increase in response to precipitation and that graywacke and schist terrain respond to similar mechanisms of movement.

To gain insight into anticipated long-term hillslope deformation, the 44-year climate record as used to develop a 100-year annual series consisting of annual API values. These, in turn, were used to calculate the expected suite of annual movements during a century. Summing these provide an estimate of average hillslope movement per century.