SWES Colloquium Series 2014-2015

Department of Soil, Water and Environmental Science

Causes and Consequences of Runoff Variability

Tradeoffs between the magnitude and frequency of events are well known in the natural sciences, particularly when processes have intrinsic thresholds. Although the role of climate in geomorphology is most often couched in terms of mean annual conditions, recent research has highlighted that runoff variability exerts a first-order control on sediment transport, river incision, and fluvial landscape evolution. Indeed, it has been shown that recently observed non-linear relationships between erosion rate and topography are plausibly explained primarily by the variability of runoff in the presence of thresholds of coarse bedload mobilization and river incision. Moreover, the strength of hypothesized two-way coupling between climate and tectonics in active orogenic wedges is dictated by the non-linearity between erosion rate and topography. Thus the controls on runoff variability have profound implications. We study historical rainfall and runoff records to determine the proximal drivers of runoff variability. We show that runoff variability is strongly influenced by fractional evapotranspiration losses (ET/P) via their control on antecedent soil moisture state. Consequently, the efficiency of ecosystem water use across a climate gradient arguably sets the strength of coupling between tectonics and climate.

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Monday, September 29, 2014 -- 3:00pm

Marley 230

Refreshments at 2:45

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