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Hydrological statistics may help explain inter-annual variability of annual net primary productivity

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Knapp and Smith (A. K. Knapp and M. D. Smith, 2001, Science 291, 481) suggested that the inter-annual variability in aboveground net primary productivity (ANPP) of several terrestrial biomes was not related to precipitation variability. They showed that the coefficient of variation (CV) in ANPP increased from deserts, peaking for grasslands and declined again for forest systems. Interestingly the peak in the CV of ANPP occurred where mean annual precipitation approximately equalled potential evaporation. From previous work on hydrological thresholds we found a similar peak in the tendency for flow events to cluster in time and with soil moisture temporal variability to peak. Additionally, recent work in the hydrological sciences suggests spatial variability in soil moisture peaks similarly as a function of aridity too. These simple models might provide direct links or at the least analogous for understanding some of the controls on the inter-annual variability in ANPP.