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# Averaging rainfall under predicts runoff at the point scale

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This paper investigates the effects of using non-linear, high resolution rainfall, compared to time averaged rainfall on the triggering of hydrologic thresholds and therefore model predictions of infiltration excess, saturation excess, runoff, drainage and storage. Rainfall intensities, at various time resolutions, ranging from 1.875 minutes to 2 hours, were generated using the bounded random cascade model, parameterized to south western Australian rainfall. A numerical analysis was conducted using a one dimensional, conceptual rainfall partitioning model that instantaneously partitions water into infiltration excess, infiltration, storage, deep drainage, saturation excess and runoff, where the fluxes into and out of the soil store are controlled by thresholds. For example, deep drainage is triggered when the soil matrix storage equals or exceeds field capacity. The construction of similarity parameters, relating soil and storm properties, allowed us to show parameter ranges where model predictions were sensitive to rainfall resolution. The results of our numerical modelling indicate parameter ranges where using time averaged rainfall data results in an under prediction of runoff and an over prediction of soil drainage. The results also indicate parameter ranges where runoff will be dominated by infiltration excess or saturation excess depending on the resolution of rainfall data. This study suggests that predicted levels of water entering the soil, draining through the soil and running off a slope will depend on the resolution of rainfall data. This study has important implications for the accuracy of current hydrological models. It offers insight into areas where the understanding of the dynamics of high resolution rainfall is required and a means by which we can improve our understanding of the way variations in rainfall intensities within a storm relate to hydrological thresholds and model predictions.