



## **Connectivity and threshold behaviour for overland flow**

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Although hydrological connectivity can be defined between any two points, the aggregate response of a hillslope or catchment is often the practical objective, representing the integral of connectivity between the many points on which rain falls and the slope-base subset of points that deliver water to a collector or natural channel. A growing number of studies, for both humid and semi-arid areas, now suggests that some aspects of this aggregate behaviour can be represented as a threshold, through fill-and-spill mechanisms or through processes of network aggregation. In the very simplest model systems, a rather sharp threshold can be observed, but more realistic cases generally show a 'shoulder' region between zero responses and a linear increase with increasing storm size, and behaviour in this region is important for many observed storm events and for overall magnitude/frequency distributions. Models for infiltration excess overland flow suggest that the form of this shoulder depends only partly on heterogeneities associated with spatial variability in infiltration capacity and micro-topography. By explicitly expressing overland flow as a power function of flow depth and gradient, the value of the threshold and response near to the threshold can be shown to depend rationally on slope gradient and slope length as well as on storm characteristics.