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Widespread Hortonian overland flow in deserts: is the classical argument applicable in the drylands of western New South Wales, Australia?

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One of the classical arguments that is often repeated in the literature of geomorphology is that desert rainfall is localised and of high intensity, and that this, in combination with soils of low infiltrability, results in frequent and widespread Hortionian overland flow. Drylands are diverse, and it is important to examine the extent to which this classical generalisation actually applies in particular regional case studies. For the drylands of western NSW, Australia, convective rainfall of moderate intensity does occur. However, examination of data suggests that other environments, e.g. alpine environments, may experience a distribution of rain event sizes more skewed to high rain rates than do the drylands. Additionally, given that water is a scarce resource for dryland ecosystems, community level adaptations, in the form of soil and vegetation mosaics, have evolved and serve to efficiently retain water and other resources within very compartmentalised landscapes. Examination of the hydrology of these landscapes shows that runoff is completely absents in many rainfall events of short duration and/or low rain rate. Even in larger events, efficient trapping within vegetation mosaics limits the spatial extent and connectivity of overland flow. Only in the largest rainfall events does the rainfall exceed the capacity of the ecosystem retention systems, allowing integrated hillslope overland flow (Hortonian runoff). Thus, the classical generalisation is seen to apply only to a minor extent in the case of these NSW drylands.