



## **Groundwater controls on flash flood shape and incidence**

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The development of a fully coupled flash flood routing and numerical groundwater model for ephemeral streams and alluvial aquifers indicated that in semi-arid and arid environments aquifer properties and groundwater level control flash flood shape and incidence. A series of small, medium and large flash flood waves were routed through alluvial aquifers with varying characteristics such as aquifer thickness, hydraulic conductivity, depth to water table and width. The numerical study indicated that general relationships between flash flood shape, incidence and aquifer properties exist. The coupled modeling showed that especially the steepening of the rising limb of flash floods was related to transmission loss dynamics depending on specific aquifer properties. It could be shown that the characteristic steep front of some flash floods resulted from a sharp cessation of infiltration during the early phase of flash flood transmission and, hence, is linked to hydrogeological characteristics that can be evaluated based on field work or pre-event monitoring. Also the significant impact of antecedent hydrogeological conditions on flash flood size and shape could clearly be demonstrated. In summary, flash floods generation, besides meteorological and catchment related properties, is affected by predictable hydrogeological factors. Systematic and predictable relationships between alluvial aquifer properties and flash flood characteristics exist in dryland ephemeral rivers. The knowledge on aquifer and groundwater control on flash floods can help improving the assessment of flash flood risk.