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Runoff generation through ephemeral streams in south-east Italy

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Ephemeral streams are morphological elements, typical of karst areas, characterized by relatively large and flat bottom transects (Camarasa & Tilford, 2002). These occasionally drain runoff generated by extreme rainfall events, characterized by high return periods. The activation of these streams was investigated by several authors for the Mediterranean regions, and in particular for south Spain and north Africa (Camarasa & Segura, 2001; De Vera, 1984). However, there are few analyses for karst areas of south-east of Italy (Cotecchia, 2006; Polemio, 2010).
South-east of Italy, in particular the central part of Apulia, is characterized by a karst morphology, with a moderately elevated plateau, namely Murgia, which is drained by a network of ephemeral streams. These are normally dry, relatively short-length and straights, and their main outlets are on the coast. They normally drain water after extraordinary rainfall events, which can generate very high discharges, which can potentially flood the areas close to the streams. For this reason, the definition of an activation threshold for ephemeral streams is a paramount problem, even if this constitutes a complex problem, since the dynamics of the catchment drained by these streams in highly non-linear and biased by multiple variables (e.g. urbanization, land use, etc.).
The main problem affecting the analysis and prediction of flood events in karst semi-arid regions is the almost complete absence of discharge time-series, measured at the outlets of the ephemeral streams. This prevents from the identification of accurate statistics of flood events and on the determination of rainfall events, which may potentially generate floods. Indeed, floods and in general flash floods are relatively rare events for semi-arid karst regions, however they can be really severe and disruptive, causing serious damages to people and infrastructures.
This work presents an analysis of the ephemeral stream activation in karst semi-arid areas, in a partially urbanized catchment located in Apulia (south east of Italy). The analysis is based on full 2D simulation of the behaviour of a network of ephemeral streams. A full 2D approach integrates the hydrological and hydraulic models, in order to account first for the dynamic of catchment response to rainfall and activation of the streams, and then for the hydraulic behaviour of the streams. This analysis entails the simulation of extreme events corresponding to low, medium and high return periods, in order to identify which event presumably activate the ephemeral streams.

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