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Effects of Soil Moisture Thresholds in Runoff Generation in two nested gauged basins

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Regarding catchment response to intense storm events, while the relevance of antecedent soil moisture conditions is generally recognized, the role and the quantification of runoff thresholds is still uncertain. Among others, *Grayson et al*. (1997) argue that above a wetness threshold a substantial portion of a small basin acts in unison and contributes to the runoff production. Investigations were conducted through an experimental approach and in particular exploiting the hydrological data monitored on "*Fiumarella of Corleto*" catchment (Southern Italy). The field instrumentation ensures continuous monitoring of all fundamental hydrological variables: climate forcing, streamflow and soil moisture. The experimental basin is equipped with two water level installations used to measure the hydrological response of the entire basin (with an area of 32 km^2) and of a subcatchment of 0.65 km^2. The aim of the present research is to better understand the dynamics of soil moisture and the runoff generation during flood events, comparing the data recorded in the transect and the runoff at the two different scales. Particular attention was paid to the influence of the soil moisture content on runoff activation mechanisms. We found that, the threshold value, responsible of runoff activation, is equal or almost to field capacity. In fact, we observed a rapid change in the subcatchment response when the mean soil moisture reaches a value close to the range of variability of the field capacity measured along a monitored transect of the small subcatchment. During dry periods the runoff coefficient is almost zero for each of the events recorded. During wet periods, however, it is rather variable and depends almost only on the total rainfall. Changing from the small scale (0.65 km^2) up to the medium scale (represented by the basin of 32 km^2) the threshold mechanism in runoff production is less detectable because masked by the increased spatial heterogeneity of the vegetation cover and soil texture.