

Spatio-temporal variability of shallow groundwater during rainfall-runoff events in a Mediterranean mountain catchment (Vallcebre Research Catchments, Spain)

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With the aim of improving the knowledge of the hydrological functioning of Mediterranean mountain areas, this work investigates the spatial and temporal dynamics of the depth to water table during rainfall-runoff events in the Vallcebre Research Catchments (NE Spain, 42° 12'N, 1° 49'E). In combination with rainfall and runoff measurements, the depth to the water table was monitored at 13 locations within the Can Vila catchment (0.56 km²) during 19 rainfall-runoff events. The distribution of piezometers in the catchment allows examining the effect of topography and distance from the stream on the spatial and temporal distribution of depth to water table. On the other hand, the analysis of different rainfall-runoff events allows investigating the role of antecedent wetness conditions on the shallow groundwater dynamics associated to the streamflow response. Results show that the depth to water table did not rise in unison throughout the catchment during rainfall-runoff events. The shallow groundwater response was clearly different between locations near and far from the stream. However, this response was not clearly related to the topography. The antecedent wetness conditions were found as the most important control on the spatio-temporal variability of the groundwater response, which in turn affects the magnitude of the streamflow response. In dry conditions, a higher spatio-temporal variability of depth to water table as well as a much slower response of the groundwater was observed.