



Infiltration and percolation processes in the vadose zone of a local perched hillslope aquifer system

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Due to a lack of boreholes in a 105km² Mediterranean karstic watershed on the Western slopes of the West Bank, surface-near recharge processes were assessed by measuring rainfall, soil moisture balance, runoff and daily spring flow in a perched local aquifer. A soil and site classification matrix was set-up to reflect, categorize and instrument the different zones of soil thickness, relief, slope & exposition, land forms & plant cover, land use and underlying geology. Spatially, a strong correlation between underlying geology (lithology and hydrostratigraphy) and soil water availability for plants was observed on site and accordingly, instrumentation was designed to reflect this variability. The high temporal resolution of rainfall, evapo-transpiration, runoff generation, soil percolation processes (minute scale) and spring flow (daily) allows for a clear differentiation, robust approximation and quantification of recharge processes on the event, seasonal and multi-annual scale. As such the black-box factors within the vadose zone of a perched, slightly karstified carbonate aquifer on the western slopes of the Palestinian West Bank could be characterized and shallow percolation, subsurface runoff and interflow be separated conceptually from indirect deeper percolation on the regional scale. Our data documents spatial and temporal variabilities of karstic recharge at the hillslope scale. For the first time in this environment, simultaneous observation of evaporation factors, rainfall and runoff on site allowed for forward calculations of the independent key factors & thresholds and their mutual interdependence.