



Soil moisture controlled runoff mechanisms in a small agricultural catchment in Austria.

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Understanding runoff generation mechanisms is pivotal for improved estimation of floods in small catchments. However, this requires in situ measurements with a high spatial and temporal resolution of different land surface parameters, which are rarely available distributed over the catchment scale and for a long period. The Hydrological Open Air Laboratory (HOAL) is a hydrological observatory which comprises a complex agricultural catchment, covering 66 ha. Due to the agricultural land use and low permeability of the soil part of the catchment was tile drained in the 1940s. The HOAL is equipped with an extensive soil moisture network measuring at 31 locations, 4 rain gauges and 12 stream gauges. By measuring with so many sensors in a complex catchment, the collected data enables the investigation of multiple runoff mechanisms which can be observed simultaneously in different parts of the catchment. The aim of this study is to identify and characterize different runoff mechanisms and the control soil moisture dynamics exert on them.

As a first step 72 rainfall events were identified within the period 2014-2015. By analyzing event discharge response, measured at the different stream gauges, and root zone soil moisture, four different runoff mechanisms are identified. The four mechanisms exhibit contrasting soil moisture-discharge relationships. In the presented study we characterize the runoff response types by curve-fitting the discharge response to the soil moisture state. The analysis provides insights in the main runoff processes occurring in agricultural catchments. The results of this study can be of assistance in other catchments to identify catchment hydrologic response.