

Interactive comment on “Plot and field scale soil moisture dynamics and subsurface wetness control on runoff generation in a headwater in the Ore Mountains” by E. Zehe et al.

Anonymous Referee #2

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This paper presents an interesting study based on field data collected by an advanced surface soil moisture monitoring system, named Spatial TDR (STDR), which is able to provide a cluster of simultaneous and continuous vertically integrated soil moisture observations within a limited spatial extent. The data have been collected in two (grassland and forested) experimental sites within a 16 km² catchment. The monitoring system is original and promising. To my knowledge, this is the first paper presenting such a valuable data set and applying it for hydrological investigations. First, the authors describe the temporal evolution of the observed soil moisture patterns and their corresponding spatial statistics (first and second moments and spatial correlation structure)

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for different average wetness conditions. Then they evaluate if the first moment of the surface soil moisture could be exploited as predictor of the catchment discharge. Many studies in the past explored the possibility to infer the catchment state from single point soil moisture observations. This study points out that single point measurements could not provide representative catchment state information, as instead a cluster of continuous soil moisture observations can do, particularly in highly heterogeneous environment.

The paper also compares the observed soil moisture data to those simulated with a physically based model. The aim of this modelling exercise is less clear. Actually the part of the paper representing the model results seems weakly connected with rest of the paper. The model application may deserve a separate paper, where larger space could be given to the discussion concerning the model setup and validation.

The discussion between the first reviewer and the corresponding author clarified already many aspects of the paper.

I would suggest also improving the sentences in the lines P7519L9-21. What does it mean “subsurface storm flow or fast groundwater flow is the dominating runoff mechanism”? Does it mean that catchment contributing area during the event is namely controlled by saturation excess? Or that event discharge is mainly originated by subsurface storm flow or “fast groundwater flow”? Maybe the following sentence is incomplete (P7519L19-21): “We thus conclude that ground water contribution to total runoff production is stronger in, which explains the slower recession at a high catchment wetness”.

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