



Modeling soil moisture patterns in a microscale forest catchment

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The study investigates the spatial variability of the soil moisture on the microscale forest Wüstebach (27 ha) basin. A fully-integrated surface-subsurface flow model is applied to the Wüstebach headwater catchment in Germany which is a tributary to the Erkensruhr river and has a catchment size of about 27 ha. The catchment which is part of the Eifel national park is completely covered by spruce. The catchment is well characterized and monitored. In addition to the discharge data measured since 2007, soil moisture were measured discontinuously at a number of points. In summer 2009 a wireless sensor network was implemented which collects soil moisture data in three different depths at 150 points with an hourly resolution.

Spatial patterns of soil moisture provide powerful information for testing distributed models and can provide independent information that are complementary to more traditional data as point discharge measurements. The 3-D fully coupled flow simulation model HydroGeoSphere was applied to this headwater catchment in two spatial resolutions (25 and 100 m). The distributed hydrological model produces spatially explicit predictions that allow more detailed analysis in decision-making than lumped models. With the model the importance of the spatial features of soil moisture patterns is quantified.

We will present simulation results as well as a comparison of the predicted spatial patterns of soil moisture with those observed by the wireless sensor network. The comparison will be done using cell-by-cell method, which allows expressing the strength of agreement between simulated and observed soil moisture patterns through measures of similarity between two maps based on a contingency table and expressed in terms of Kappa statistics.