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Detecting seasonal variations of soil parameters via field measurements and stochastic simulations in the hillslope

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Soil moisture, a critical factor in hydrologic systems, plays a key role in synthesizing interactions among soil, climate, hydrological response, solute transport and ecosystem dynamics. The spatial and temporal distribution of soil moisture at a hillslope scale is essential for understanding hillslope runoff generation processes. In this study, we implement Monte Carlo simulations in the hillslope scale using a three-dimensional surface-subsurface integrated model (3D model). Numerical simulations are compared with multiple soil moistures which had been measured using TDR(Mini_TRASE) for 22 locations in 2 or 3 depths during a whole year at a hillslope (area: 2100 square meters) located in Bongsunsa Watershed, South Korea. In stochastic simulations via Monte Carlo, uncertainty of the soil parameters and input forcing are considered and model ensembles showing good performance are selected separately for several seasonal periods. The presentation will be focused on the characterization of seasonal variations of model parameters based on simulations with field measurements. In addition, structural limitations of the contemporary modeling method will be discussed.