Supplementary Material

The volume and fluxes in the fast and slow flow domains were estimated using Eq. Soil fluxes were estimated using Eqs. (11, 12). With the approach applied in this study, the parameters (a, b, and θ_o) were estimated by fitting Eq. (11) to the measured hourly change in storage ($\theta_i - \theta_{i+1}$) and the total soil storage (θ). Fitting was conducted only during periods of soil moisture recession ($\theta_i - \theta_{i+1} < 0$) and during periods of negligible soil evaporation and root-uptake. The measured soil moisture was ranked (highest to lowest), and grouped into equal bin sizes prior to regression. The bin size was determined by the minimum number of hourly data points where the standard deviation of a bin was less than half of its mean. To account for additional complexities of infiltration, rainfall periods were assumed to fully infiltrate. An additional downward flux was included during this period due to temporally varying soil water pressures, which were not estimated here. The additional downward flux was estimated using the difference between the estimated soil moisture (Eq. 12) and the measured soil moisture at the end of the time-step. A comparison to HYDRUS 1-D was conducted for each control volume simulated with the SAS functions (5, 10, 15, and 20 cm). There was good agreement between the simple soil moisture regression method and the simulation from HYDRUS-1D. The method applied here is applicable only to the assumption that all soil flow is downward. This resulted in some deviations between the simple storage-discharge relationship and the HYDRUS-1D model during low flow conditions.

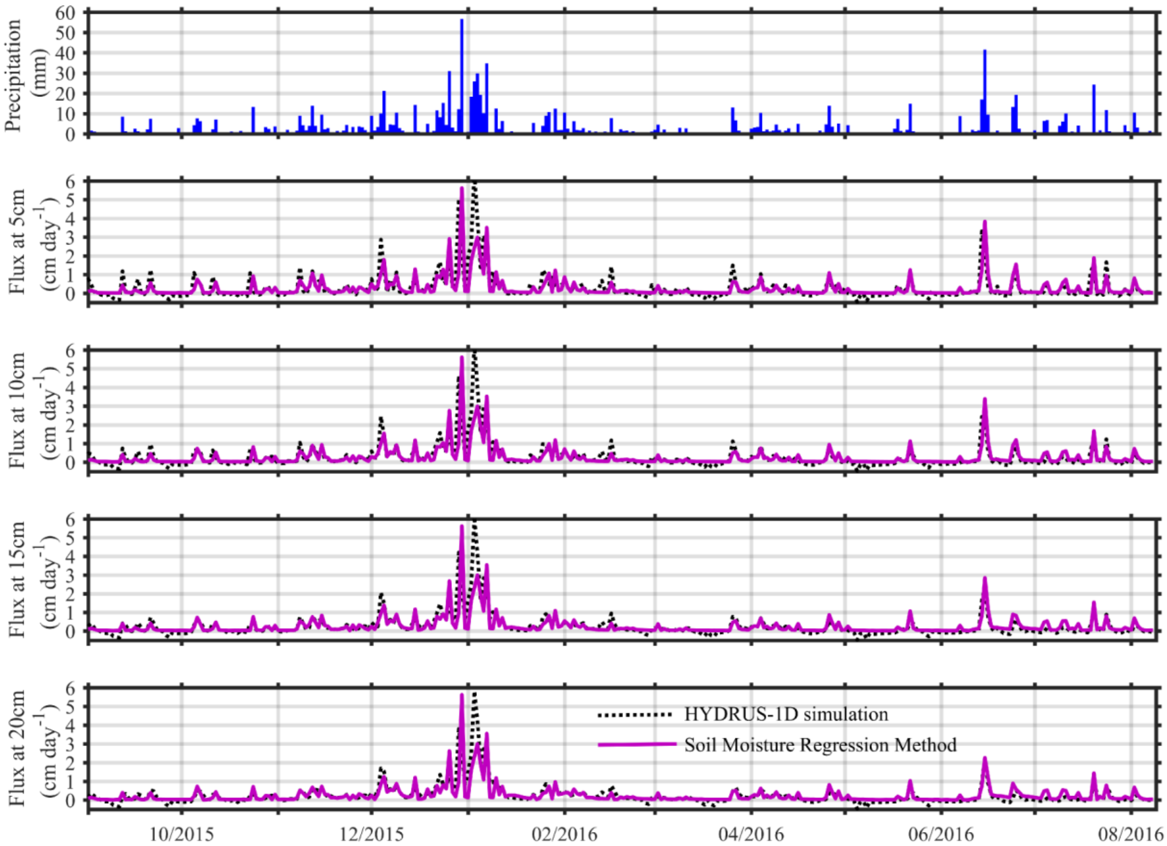

Figure S1: Comparison of HYDRUS-1D simulations to the soil moisture regression method at 5, 10, 15, and 20 cm depths at Site A. with the corresponding daily precipitation amounts. Evaluation at Site B is similar.