Geophysical Research Abstracts
Vol. 18, EGU2016-2463, 2016
EGU General Assembly 2016

Integrating Real-time and Manual Monitored Soil Moisture Data to Predict Hillslope Soil Moisture Variations with High Temporal Resolutions

Qing Zhu, Ligang Lv, Zhiwen Zhou, and Kaihua Liao
Institute of Geography and Limnology, Chinese Academy of Sciences, Nanjing, China (qzhu@niglas.ac.cn)

Spatial-temporal variability of soil moisture 15 has been remaining an challenge to be better understood. A trade-off exists between spatial coverage and temporal resolution when using the manual and real-time soil moisture monitoring methods. This restricted the comprehensive and intensive examination of soil moisture dynamics. In this study, we aimed to integrate the manual and real-time monitored soil moisture to depict the hillslope dynamics of soil moisture with good spatial coverage and temporal resolution. Linear (stepwise multiple linear regression-SMLR) and non-linear models (support vector machines-SVM) were used to predict soil moisture at 38 manual sites (collected 1-2 times per month) with soil moisture automatically collected at three real-time monitoring sites (collected every 5 mins). By comparing the accuracies of SMLR and SVM for each manual site, optimal soil moisture prediction model of this site was then determined. Results show that soil moisture at these 38 manual sites can be reliably predicted (root mean square errors<0.035 m3 m-3) using this approach. Absence or occurrence of subsurface flow can probably influence the choosing of SMLR or SVM in the prediction, respectively. Depth to bedrock, elevation, topographic wetness index, profile curvature, and relative difference of soil moisture and its standard deviation influenced the selection of prediction model since they related to the dynamics of soil water distribution and movement. By using this approach, hillslope soil moisture spatial distributions at un-sampled times and dates were predicted after a typical rainfall event. Missing information of hillslope soil moisture dynamics was then acquired successfully. This can be benefit for determining the hot spots and moments of soil water movement, as well as designing the proper soil moisture monitoring plan at the field scale.