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Agricultural drought assessment at spatial and temporal scales using remotely sensed data

Yongchul Shin (1), Kyungwon Park (2), Jinyoung Rhee (2), and Sunkwon Yoon (2)

(1) School of Agricultural Civil & Bio-Industrial Engineering, Daegu, Kyungpook National University, South Korea(ycshin@knu.ac.kr), (2) APEC Climate Center, Busan, South Korea (skyoon@apcc21.org)

We estimated soil moisture dynamics in the root zone based on a soil moisture data assimilation scheme using remotely sensed (RS) data. The data assimilation scheme estimated the soil hydraulic and root parameters from MODerate resolution Imaging Spectroradiometer (MODIS) data. Then, root zone soil moisture was estimated at spatio-temporal scales based on the estimated soil/root parameters and weather forcings. We validated our approach at the Little Washita(LW13) in Oklahoma and Chungmi-cheon/Seolma-cheon sites. The estimated water retention curves identified well with the measurements at the LW 13 site. Also, the estimated root zone soil moisture dynamics showed an agreement with the Time Domain Reflectrometry(TDR)-based measured data. Furthermore, we tested this approach at ungauged regions (Seolma Cheon-SC and Chungmi Cheon-CC) South Korea indicating that the soil/root parameters at the pixel where the SC site is located were derived from the calibrated MODIS-based(the CC site) soil moisture values. Then, the estimated root zone soil moisture values were validated with the measured data at the SC site. Although the model outputs were slightly overestimated compared to the measured data, these results showed the applicability of this proposed approach in application to ungauged regions. Thus, our proposed approach can be helpful to evaluate root zone soil moisture at spatio-temporal scales across South Korea.

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