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Evaluating the added-value of state-of-the-art soil property maps in land surface modeling over the Contiguous United States

Chengcheng Xu, Laura Torres Rojas, and Nathaniel W Chaney
Duke University, Civil and environmental engineering, United States of America (chengcheng.xu@duke.edu)

The accurate representation of soil properties in the land component of Earth system models (land surface models; LSMs) remains a persistent challenge. The emergence of state-of-the-art continental-scale digital soil mapping (DSM) provides a unique opportunity to address this weakness (e.g., SoilGrids and POLARIS). However, it remains unclear whether these data are able to improve the modeling of land surface fluxes and states (e.g., latent heat flux). This presentation addresses this question by running and evaluating a field-scale resolving land surface model (HydroBlocks) at each of the eddy covariance sites in the NEON and Ameriflux networks over the Contiguous United States (~250 sites). More explicitly, the HydroBlocks LSM is run at a 30-meter spatial resolution in 5 km boxes centered around each of the NEON eddy covariance sites using both the POLARIS and Soilgrids soil properties databases. The model is also run using the CONUS-Soil (i.e., STATSGO) soil properties database as a baseline for comparison. Each simulation is run between 2002 and 2018 at a 1-hour resolution. The remaining datasets used to parameterize and force HydroBlocks includes the Princeton Climate Forcing meteorological dataset (PCF), USGS elevation data, and the National Land Cover dataset (NLCD) with a 5-year spin-up period. The simulated soil moisture and land surface fluxes are then evaluated using available in-situ and eddy covariance measurements in the NEON and Ameriflux networks using a suite of performance metrics over multiple temporal scales.