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P-10 Intercomparison and Validation of Soil Moisture Estimates from Microwave and Thermal Infrared Remote Sensing and Land Surface Model

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Significant advances have been achieved in generating soil moisture (SM) data products from satellite remote sensing and/or land surface modeling with reasonably good accuracy in recent years. However, the discrepancies among the different SM data products can be considerably large, which hampers their usage in various applications. The bias of one SM product from another data source is well recognized in the literature. Bias estimation and correction methods have been well documented for assimilating satellite SM product into land surface and hydrologic models. Nevertheless, understanding the characteristics of each of these SM data products is required for many applications where the most accurate data products are desirable. This study inter-compares five SM data products from three different sources over 14-year period from 2000 to 2013. Specifically, three microwave (MW) satellite based data sets (ECV, ECV active and passive products), one thermal infrared (TIR) satellite based product (ALEXI), and the Noah land surface model (LSM) simulations. The in-situ SM measurements from the North American Soil Moisture Database (NASMD), which involves more than 600 ground sites from a variety of networks, are used to evaluate the accuracies of these five SM data products. In general, each of the five SM products is capable of capturing the dry/wet patterns over the study period. However, the absolute SM values among the five products vary significantly. SM simulations from Noah LSM are more stable relative to the satellite-based products. Both TIR and MW satellite based products are relatively noisier than the Noah LSM simulations. Even though MW satellite based SM retrievals have been predominantly used in the past years, SM retrievals the ALEXI model based on TIR satellite observations demonstrate skills equivalent to all the MW satellite retrievals and even slightly better over certain regions. Compared to the individual active and passive MW products, the merged ECV product exhibits the higher anomaly correlation with both Noah LSM estimates and in-situ SM measurements.