
Evaluating the Application of Multi-Satellite Observations in Hydrologic Modeling

When monitoring local or regional hydrosphere dynamics for applications such as agricultural productivity or drought and flooding events, it is necessary to have accurate, high-resolution estimates of terrestrial water and energy storages. Though in-situ observations provide reliable estimates of hydrologic states and fluxes, they are only capable of accurately capturing the dynamics at relatively discrete points in space and time, which makes them inadequate for characterizing the variability of the water budget across scales. In contrast, satellite-based remote sensing is ideal for providing observations of hydrological states and fluxes because it provides spatially-distributed observations at spatial and temporal scales required for regional land surface process modeling. Due to the continued progress in algorithm development and emerging satellite technology, we now have near-real time monitoring of several components of the water cycle including precipitation, soil moisture, lake and river height, terrestrial water storage, snow cover, and evapotranspiration. As these data become more readily available, their application to hydrologic modeling is becoming more common, however there remains little consensus on the most appropriate method for optimal integration and evaluation in regard to hydrological applications. Here we present two case studies operationally applying several remotely sensed products from AMSR-E, GRACE, and MODIS and discuss assimilation strategies, ease of integration and interpretation, and methods for quantifying the success of the application methodology.