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A novel method in estimating basin-scale soil moisture variability

N. Zeng and J.-H. Yoon

Department of Meteorology and Earth System Science Interdisciplinary Center University of Maryland (zeng@atmos.umd.edu)

Basin-scale soil moisture is traditionally estimated using either land-surface model forced by observed meteorological variables or atmospheric moisture convergence from atmospheric analysis and observed runoff. These suffer from major uncertainties due to imperfections in the land-surface or the atmospheric models. Here we introduce a novel method in estimating basin-scale soil moisture. The key elements of the method are observed precipitation and runoff, and reconstructed evaporation. We will show the results for the tropics using the example of the Amazon basin. The seasonal cycle of diagnosed soil moisture over the Amazon is about 200mm, compares favorably with satellite estimate from the GRACE mission, thus lending confidence both in this method and the usefulness of space gravity based large-scale soil moisture estimate. This is about twice as large as estimates from the traditional methods, suggesting that current models tend to under estimate the soil moisture variability. We also discuss the application and limitations of the method to midlatitude regions and results on interannual soil moisture variability.