ESTIMATING WATERSHED EVAPOTRANSPIRATION ACROSS THE UNITED STATES USING MULTIPLE METHODS

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Evapotranspiration (ET) is the largest watershed water balance component only next to precipitation in the United States. ET is closely coupled with ecosystem carbon and energy fluxes, affects flooding or drought magnitude, and is also a good predictor for biodiversity at a regional scale.Thus, accurately estimating ET is of paramount importance to quantify the effects of land use change and climate change on watershed ecosystem services in water supply, water resources management, carbon sequestration, and biodiversity conservation. However, ET remains to be an imprecise science and difficult to quantify at the watershed level.This study compared ET estimates for over 400 watersheds with size ranging 40-25751 km^2 using multiple independent methods including watershed water balance (Precipitation – Streamflow or P-Q method), eddy covariance net work (AmeriFlux, NEBFLUX) approach by up-scaling eddy flux measurement using the regression tree method (EC-MOD), MODIS based remote sensing approach, and watershed hydrologic modeling (e.g., WaSSI, SWAT). Our preliminary analysis found that there were large discrepancies in the computed watershed ET estimates among the selected methods due to different assumptions and limitations among the ET methods. In particular, ET estimated by the eddy covariance method or MODIS products were 25-40 percent lower than the estimates by the P-Q method. The WaSSI model generally over-estimated ET by 20 percent when compared to the P-Q (534±196 vs 487±263 mm/yr) method.We discuss the potential causes of the discrepancies found in this study and methods to improve ET estimates at a watershed scale.

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