Replacing climatological potential evapotranspiration estimates with dynamic satellite-based observations in operational hydrologic prediction models

Kristie J. Franz¹, Angela Bowman², Terri S. Hogue², Jongyoun Kim², Ryan Spies¹
1. Department of Geological and Atmospheric Sciences, Iowa State University, Ames, IA
2. Department of Civil and Environmental Engineering, University of California, Los Angeles, CA

Current operational streamflow forecasting utilizes watershed-scale, conceptual models driven by ground-based (commonly point-scale) observations of precipitation and temperature and climatological potential evapotranspiration (PET) estimates. The PET values are derived from historic pan evaporation observations and remain static from year-to-year. With the advent of satellite remote sensing and the adoption of a more flexible operational forecast system by the National Weather Service, incorporation of advanced data products is now more feasible than in years past.

**UCLA MODIS-PET**

We are testing a satellite-derived PET product (UCLA MODIS-PET; Kim and Hogue., 2008) in the National Weather Service forecast models. The objective of our work is to improve operational hydrologic forecasts through the near real-time application of advanced satellite data products.

The UCLA MODIS-PET method is based on the Priestley-Taylor formulation, is driven with MODIS satellite products, and produces a daily, 1km PET estimate.

**Study sites**

The focus area is eight headwater basins in the upper Midwest U.S. This region is highly flood prone yet sensitive to prolonged dry periods in late summer and early fall, and is characterized by a highly managed landscape, which has drastically altered the natural hydrologic cycle. Our goal is to improve model simulations, and thereby, the initial conditions prior to the start of a forecast through the use of PET values that better reflect actual watershed conditions. The forecast models are being tested in both distributed and lumped mode.

**Acknowledgements**

Funding for this work was provided by NASA grant NNX10AQ77G S01. We would like to thank personnel at the NWS/NCRFC, and in particular Mike DeWeese, for their assistance in site identification and data collection.

**References**


J. Hydrometeorol. 9, 444-460.