Quantifying Evapotranspiration across Varying Seasonal and within-season Climatic Signals across Oklahoma

Jeffrey B. Basara, Kenneth C. Crawford, Oklahoma Climatological Survey, University of Oklahoma

Minor climatic shifts in the seasonality of precipitation, soil moisture, evaporation, and storage (surface water and ground water) can have significant impacts on the availability of water. The spatial and temporal trends of such variables are important to quantify, especially as the state of Oklahoma continues to see increased demand for water resources (e.g., due to increased population, irrigation for agriculture, recreational activities, etc.). A further challenge is distinguishing between significant, within-season weather events and whether or not such conditions are a result of changing climate. Further, while long-term analyses have noted significant variability in temperature and precipitation across Oklahoma, the need exists to understand the variability of water balance components across the state and how they may be changing.

To better understand the redistribution of precipitation to evapotranspiration, storage, (i.e., soil moisture / effective precipitation) and potential runoff, observations from the Oklahoma Mesonet are presented for the period spanning 1994-present. This dataset includes approximately 15 years of high-resolution temperature, humidity, precipitation, wind speed, and soil moisture data during a period with significant seasonal and within-season signals of varying climate including flash droughts, long-term drought, and periods of excessive precipitation. Thus, the study quantifies (a) the variations of evaporation and effective precipitation across a range of seasonal and within-season conditions and (b) relevant baseline values for future studies and comparative analyses.