# EVALUATION OF ACTUAL EVAPOTRANSPIRATION RATES FROM THE OPERATIONAL SIMPLIFIED SURFACE ENERGY BALANCE METHOD IN FLORIDA

***Nicasio Sepulveda***
USGS-Caribbean-Florida Water Science Center, Orlando, FL, USA

Evapotranspiration (ET) is commonly the second largest component of the water budget in Florida and could be the largest in years of droughts. Reliable estimates of actual evapotranspiration (ETa) rates are needed by water-resource managers in surface-water and groundwater-flow studies. The operational Simplified Surface Energy Balance (SSEBop) method uses potential evapotranspiration, air temperature, and remotely-sensed land-surface temperature to calculate ETa in one-square kilometer cells. SSEBop ETa rates were compared with two independent methodologies: the water-budget balance equation and field-scale ETa measurements.

The water-budget analysis was completed in 56 basins throughout Florida from 2000 to 2017 and involved using the water-balance equation to solve for ETa rates. Coefficients of determination (R square) between monthly SSEBop-generated ETa rates and field-measured ETa (mETa) rates ranged from 0.59 at the forest station to 0.79 for pasture stations; root-mean-square errors between SSEBop ETa and mETa rates ranged from 0.60 inch per month (in/mon) at the urban station to 1.08 in/mon at the forest station. Bias corrections to SSEBop rates were made to all cells using linear regressions of mETa-SSEBop versus SSEBop rates. Differences in annual averages between corrected SSEBop ETa rates and those calculated from the water-budget balance equation, calculated over the 2000 to 2017 period, were less than 15 percent for most of the 56 basins. Root-mean-square errors between bias corrected SSEBop ETa rates and mETa ranged from 0.40 inch per month (in/mon) at the urban station to 0.73 in/mon at the open-water stations. Bias corrected SSEBop ETa rates could be used to quantify the role of drought, fire, landscape type, seasonality, or water-table depth on ETa in Florida and, thus, improve the efficacy of hydrologic models used for water-supply planning.

**PRESENTER BIO:** Dr. Sepulveda is a research hydrologist at the USGS with more than 30 years of experience leading studies in surface and groundwater flow, rainfall-runoff relations in watersheds, solute-transport modeling, simulation of actual evapotranspiration rates, and effects of groundwater pumping rates on the potentiometric surface of the Floridan aquifer system.