Use of Metered Irrigation Water Use and Landsat Imagery to Estimate Irrigation Rates for Surface-Water–Groundwater Availability Modeling in the Apalachicola-Chattahoochee-Flint River Basin, Southwestern Georgia

Lynn J. Torak

Abstract. Irrigated acres defined using Landsat imagery can be linked to metered irrigation in the southwestern Georgia part of the Apalachicola-Chattahoochee-Flint River Basin providing valuable ground truthing of inputs to water-availability models such as those used by the U.S. Geological Survey for the National Water Census. Since 2008, irrigation meter data have been provided to the USGS by the Georgia Soil and Water Conservation Commission under a cooperative agreement. Neither meter data nor Landsat imagery alone provides complete information on spatial and temporal variations of irrigation during the growing season. Robust geospatial modeling methods were used to first estimate irrigation depth and percent of total annual irrigation from a monthly network of 60-90 telemetry sites, and then estimate monthly percent of total irrigation at the nearly 4,000 annually read meter sites. Geospatial models of monthly irrigation depth based on annual meter data were validated by the high spatial correlation of monthly irrigation depth associated with the monthly percent models of telemetry; the latter telemetry models were applied to the annual meter data. Assignment of monthly irrigation depths to specific fields cannot be accomplished without ground truthing of actual wetted fields provided by Landsat imagery. The 16-day interval between successive Landsat images of the basin limits the imagery to identify all irrigation and wetted fields during the growing season; thus, a hybrid approach consisting of geospatial models of irrigation depth and remotely sensed evidence of irrigated acres using Landsat imagery can prove useful for developing monthly irrigation rates for input to water-availability models.