Remote Sensing in Agricultural Hydrology

Jasmeet Judge

Collaborators: Roger DeRoo (Umich); Tony England (Umich); Jim Jones (UF); Pang-Wei Liu (UF); Alejandro Monsivais-Huerto (Mexico); Jose Principe (UF); Anand Rangarajan (UF); Sanjay Ranka (UF); Susan Steele-Dunne (Netherlands); Tara Bongiovanni (UF); and Subit Chakrabarti (UF)

Agricultural landscapes are heterogeneous and highly dynamic. Remote Sensing can be used to provide useful information regarding soil and vegetation conditions. Our research program aims to develop methodologies to use remotely sensed observations at microwave frequencies (< 10 GHz or > 3cm) to improve knowledge of soil moisture, crop growth, and yield in agricultural landscapes. Microwave observations are highly sensitive to changes in moisture content in soil and vegetation. Satellite-based microwave observations appropriate for soil moisture applications are relatively recent. The ESA-Soil Moisture and Ocean Salinity (SMOS) mission uses passive observations at 1.4 GHz and provides global soil moisture at 25 km every 2-3 days. The upcoming NASA Soil Moisture Active Passive (SMAP) mission will use active and passive observations at 1.2 and 1.4 GHz, respectively, to provide soil moisture at 10 km every 2-3 days. There are three major components of our research program: bio-physically-based remote sensing algorithms; spatial disaggregation of remotely sensed observations; and assimilation of remotely sensed observations to improve model estimates of soil moisture, crop growth, and yield.