TRACKING AND PREDICTING SOIL WATER DYNAMICS:

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Soil water dynamics are a fundamental driver of the terrestrial hydrologic cycle, environmental processes, and ecosystem productivity. For example, soil water content conditions dictate whether rain falling on the land surface will infiltrate or runoff and potentially contribute to flooding. Nitrogen transformations and subsequent losses to groundwater or atmosphere are mediated by moisture conditions in the soil. Success or failure of food, fiber, and energy production from agricultural crops depends on soil water storage between rainfall and/or irrigation events. Despite this importance, predicting soil water dynamics remains a major challenge in hydrology, environmental science, agriculture, and engineering.

Primary research goals for our group are: i) to develop remote (e.g., drones) and in situ (e.g, thermal) sensing technologies capable of tracking soil water content at a range of scales, and ii) to develop soil hydrology models for prediction of surface water partitioning between infiltration, runoff, storage, and uptake by plants. Work toward these goals includes opportunities for field and laboratory experiments aimed at detailed soil characterization and evaluation of sensor performance, as well as opportunity to develop skills in geographic information systems, sensor and data logger programming, statistical analysis, and computer modeling.