



Geospatial Characterization of Soils

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Soils by nature vary widely in their physical and chemical properties. Their distribution on the landscape is a result from the interplay of both active and passive mechanisms such as climate, organisms, time, topography, and parent material. Understanding and characterizing this heterogeneity is critical to the effective and wise use of our soil resource.

The primary focus of our group is in the use of geospatial technologies to better understand, measure, analyze, and manage spatial variability in both agricultural and environmental settings. We rely heavily on Geographic Information Systems (GIS), the Global Positioning System (GPS), and spatial analytics to help gain new insights and understandings into these complex systems. Our work spans many disciplines including remote sensing, photogrammetry, computer science, and statistics. Much of what we do combines gathering data in the field with data processing behind a computer. Currently, our studies are focused on precision agriculture where we are working to better identify and understand soil processes on the field-scale so as to better manage agriculture inputs such as seed, fertilizer, and water.

Recently, there has been a lot of interest in using Unmanned Aircraft Vehicles (UAVs or drones) in precision agriculture. UAV's provide a unique platform for gathering field-scale information at resolutions and frequencies previously unimaginable. Areas such as scouting, weed and pest identification, and nutrient management are likely applications for this new tool. Our group is currently using UAV's to investigate nutrient status in corn and wheat.

Other areas of interest include the development of surface drainage models from UAV derived imagery, biomass estimation using UAV-based point clouds, characterization of soil water via canopy temperature, and the examination of soil sampling design and interpolation on the resultant characterization of soil properties.