Utilizing remotely sensed folair characteristics to understand landscape-scale critical zone processes

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Significant advances have been made in our ability to remotely sense canopy foliar characteristics in closed canopy forests using airborne high-fidelity imaging spectroscopy (HiFIS). This technology allows for the collection of surface reflectance data in 5 nm intervals from 380-25100 nm at a spatial resolution of 1-2 meters, and can be collected contiguously over 100s of square kilometers per day. However, these data only directly provide information about the surface of the critical zone. In this presentation we discuss how HiFIS data, combined with with LiDAR derived ground digital elevation models and field soil characterization, can provide us with spatially extensive insight into critical zone processes. By developing our understanding of how erosion and biogeochemical processes control, and are controlled by, foliar characteristics, we can utilize these emerging datasets to understand how these processes play out across landscapes. We present work where we have demonstrated that HiFIS mapped foliar nutrient concentrations are associated with variable erosion pressure across hillslopes and that these maps can aid us in understanding landscape-level dynamics. In addition, we will discuss the promise for utilizing these datasets more widely to expand our understanding of the critical zone.