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Measuring Soil Properties and Processes with Thermo-Time Domain Reflectometry Sensors

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Recent advancements in fine-scale thermo-TDR measurements of soil thermal and electrical properties provide opportunities to measure state variables in soil (temperature, water content, ice content, and air-filled porosity), soil properties (bulk density, thermal diffusivity, volumetric heat capacity, thermal conductivity, and bulk electrical conductivity) and energy and mass fluxes in soil (sensible heat, latent heat for evaporation or freezing, infiltrating liquid water, and upward moving liquid water). It is also possible to estimate soil hydraulic properties from thermo-TDR thermal property and electrical property measurements. This presentation will include laboratory and field investigations that demonstrate the usefulness of thermo-TDR measurements to characterize heat and mass transfer properties and fluxes in soil.