Developments of Combined Measurement Techniques for Vadose Zone Characterization. (S01-hopmans124509-Oral)

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Abstract:

Soil water flow and solute transport measurements are generally conducted using multiple sensors at separate spatial locations and that measure at different spatial and temporal scales. Also, when different instruments are used for different soil property measurements, likely their measured values may represent different measurement volumes, causing a problem for their analysis in heterogeneous soils. Examples of combined soil measurement devices will be presented that provide multiple soil physical measurements within a single sensor design, with approximately equal measurement volumes between measurement types. The first example illustrates the combination of soil strength, water content and tensiometric measurements within a single probe, using coiled TDR technology. A second combined sensor was developed from the principles of heat flow using a multi-needle heat pulse probe. This combined sensor allows for the simultaneous measurement of both thermal diffusivity and conductivity, and its purpose was extended to also estimate soil water content and soil solution concentration. Recent developments have demonstrated that convective heat transport across the needles may be used to estimate water flow rates.

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