Improvement of the Heat-Pulse Technique for Soil Water Content Measurement. (S01-ren210640-Poster)

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Abstract:

This study was aimed to improve the heat-pulse technique in soil volumetric water content (theta) determination through examination of the factors and parameters that may affect theta accuracy during the measurement and calculation processes. Laboratory experiments were conducted on three soils of different textures. The soil samples were packed into columns with different bulk densities and water contents and a thermo-time domain reflectometry probe was employed in the measurement. The results showed that the specific heat of soil minerals (Cm) had significant influence on the accuracy of soil volumetric heat capacity (C) and theta measurements. When a general Cm value representing an average for common minerals in soils was used, the heat-pulse technique underestimated C by 9.9-17.2%, and overestimated theta by 0.038-0.066 m^3/m^3. On the contrary, the heat-pulse technique provided accurate theta measurements when soil particle density and Cm were determined experimentally or when a representative Cm was used. The appropriate Cm value is 0.922 kJ/kg^3/K^1 for the mineral soils used in the current work.

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