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Plenary Lecture: Hydrologic Application of TDR

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Hydrologic Applications of TDR

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Abstract:

Time Domain Reflectometry (TDR) has developed into a standard tool to determine volumetric soil water content in the hydrological sciences. The advantages and disadvantages of the methodology are generally well recognized. The most powerful aspect of TDR is the ability to monitor the temporal development of soil water content and bulk soil electrical conductivity in the same soil volume at a selected number of locations with a high temporal resolution. Several disadvantages are the small sampling volume, the high costs of a complete TDR system and the inability to automatically monitor soil water content of larger areas with a single TDR system. These disadvantages have resulted in the increased development of a range of other dielectric soil water content sensors, most notably capacitance probes and ground penetrating radar. In this plenary lecture, I will first give a short overview of the developments with these alternative soil water content sensors. In my opinion, this is important because TDR researchers are often involved in the validation of these emerging technologies. Next, recent insights relevant for hydrological applications are discussed. Particular attention will be paid to 1) determining soil water content variations from a single TDR measurement, 2) the impact of temperature on the soil water content measured with TDR (and other dielectric sensors, 3) the frequency content of TDR measurements and its relationship with the frequency dependent dielectric permittivity and 4) the accurate calibration of the TDR system for measuring the electrical conductivity. Finally, some personal highlights from the past five years of TDR applications in hydrology will be presented and discussed.

Keywords: Hydrology, TDR, GPR, Capacitance probes.

Primary Additional Information:

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