

Monitoring Water Content Changes in the Root Zone with Borehole Ground Penetrating Radar

Ty P.A. Ferre, D.R. Rucker, G. von Glinski

Abstract

The distribution of water within the root zone is critical to understanding of water and nutrient exchange among the subsurface, plant communities, and the atmosphere. While there are many available methods for nondestructive measurement of volumetric water content, no current method offers the ability to monitor rapidly to great depths with high spatial resolution. This measurement need must be fulfilled to allow for quantitative study of water and nutrient flux through the vadose zone. Borehole ground penetrating radar (BGPR) may provide this capability. BGPR can make rapid water content measurements to great depth with little need for medium-specific calibration. However, the method is not without limitations for shallow subsurface applications. This presentation will introduce the use of BGPR for subsurface water content measurement. Then, limitations regarding the shallowest attainable depth of measurement and the minimum measurement resolution will be addressed. Examples of field-measured water content profiles made along the San Pedro River will be presented to demonstrate improved methods of analysis leading to more accurate water content profiles. Finally, areas of future investigation aimed at improving the use of BGPR will be discussed.

Ferre, Rucker, and von Glinski are with the Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ 85721. E-mail: ty@hwr.arizona.edu.

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