

Mapping moisture Content in Soils Using Ground-Penetrating Radar

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Moisture content from surface up to the root zone is important for agricultural crops. The conservative monitoring is based on point-measurement methods. Its time consuming and expensive. We suggest to use GPR (active remote-sensing tool) technique that enables real-time and highly accurate evaluations of soils physical qualities in the field. To calculate subsurface moisture content, a soil model is required that includes texture, porosity, saturation, organic matter and effective electrical conductivity. We developed an innovative method that accurately measures spatial subsurface water content to a depth of 1.5 m in agricultural soils and applied it to two different unsaturated soil types from agricultural fields in Israel: loess soil type (Calcic haploxeralf), common in rural areas of southern Israel with about 30% clay, 30% silt and 40% sand, hamra soil type (Typic rhodoxeralf), common in rural areas of central Israel with about 10% clay, 5% silt and 85% sand. Combined field and laboratory measurements and develop model gave efficient determinations of spatial water content in the study fields. The environmentally friendly GPR system enabled non-destructive testing. The developed method for measuring moisture content in the laboratory enabled highly accurate interpretation and physical computing.