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Verification of Ground Penetrating Radar for Soil Water Content Measuring

O. Ermolaeva and A. Zeiliguer

Geo- and Hydroinformatics Center, Moscow State University of Environmental Engineering, Russia
(o_ermolaeva@yahoo.com, azeiliguer@mail.ru)

Spatially distributed water at the land surface is a vital natural resource for human being and ecosystems. Soil water content at vadose zone at regional scale controls exchange of moisture and energy between Earth surface and atmosphere, at the catchment scale - the separation of precipitation into infiltration, runoff and evapotranspiration, at the field scale - plant growing, at the small plot scale - pathway of water flow through soil profile. Hydrologist, agronomists, soil scientists and others looking for technology providing soil water content measurements across a range of spatial range. Ground penetrating radar is not destructive method of measurement for diverse application was tested in the field for mapping a spatial distribution of soil water content during infiltration event at chestnut soil of Saratov Region, Russia. A Common-MidPoint method was used to calibrate GPR OKO with a 400 MHz antenna.

At experimental plot of 50x50 m a range of 36 boreholes equipped by vertical access tubes (10 distance between) for TDR PR2 with 4 predefined depths of soil moisture measurements was prepared. TDR PR2 equipment used for measurements was calibrated on special experimental setup with soil from plot. Data sets of parallel measurements of soil water content by TDR at 4 depths of borehole locations and GPR at trace lines along ranges of boreholes were used to produce soil water content maps with geo-statistical methods.

Keywords: GPR, TDR, soil water content