



Inversion technique to derive soil moisture profile from overlapping measurements with TDR TRIME-FM3 tube sensor probe.

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Monitoring of temporal changes of water content in soil profile during infiltration and following redistribution was a key task for field investigation at the experimental site in Saratov region of Russia. For this research a TDR tube sensor-probe TRIME FM3 was used which has vertical resolution of soil moisture measurement comparable with the height of soil sound cylinder of 14.5-16 cm (diameter about 40 cm).

Standard measurement technique gives only mean or punctual results. With the aim to augment vertical spatial resolution of the TDR sensor, a special method of overlapping measurements was proposed. This method is based on the model of linear contribution of horizontal layers forming soil sound cylinder to the overall measured value. This model was tested on artificial soil monolith assembled from 18 homogeneous horizontal discrete macro layers of 5 cm height which had different predefined moisture. Firstly, a series of overlapping measurements with the step of 1 cm was produced by TDR device and compared to results of proposed model. Moisture values of discrete macro layers and parameters of soil sound cylinder were used as input for the model. At this stage the best agreement between measurements by TDR and values calculated by the model was archived by using parameter of soil sound cylinder height of 14,5-16 cm. Secondly, special calculations based on the model with the height of 14,5-16 cm of soil sound cylinder were produced to determine moisture of discrete layers from overlapping measurements. This phase of algorithm showed that the best agreement between modelled values of moisture and values determined by conventional direct

gravimetric method on samples taken from layers is for the height of 16 cm.