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Validation of profile probe for measurement of soil moisture in an Internet of Things system

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The study of water transport in the vadose zone is difficult to describe because of the variety of phenomena determining changes in soil moisture. A profile probe can be a tool that can help in the analysis of topsoil moisture. However, in order to analyse phenomena at different scales, it is necessary to integrate many probes in one system.

The aim of this work was to develop a solution to collect soil moisture and temperature data and visualise them in a user-friendly way. The use of cloud technologies and the Internet of Things IoT provided easy integration to enable further scaling of similar solutions. The developed solution based on TDR probes and the PTDT profile probe allowed the collection of data for analysis for over a year. Tests indicate that the system can be used to study water transport (dynamic moisture changes) associated with precipitation, evaporation or capillary rise. Additional temperature analysis allows the determination of soil frost depth. The current deepening water deficit and intensifying climate change indicate the need to accelerate work related to the implementation of such soil moisture monitoring systems.

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