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AGROGEO

3D soil moisture dynamics within a tree root system monitored using OhmPi, an open-source, open-hardware resistivity meter

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Abstract

In recent years geoelectrical imaging, and monitoring in particular, has become more popular to illuminate hydrological processes in the shallow subsurface. In this context, the accessibility of geophysical equipment is key to expanding the use of geophysical monitoring, and to developing novel, versatile acquisition strategies. While the robustness and practicality of commercial geophysical equipments can't be denied, they sometimes suffer from a lack of versatility for designing dedicated monitoring applications. Their cost may also be prohibitive in some contexts, such as for humanitarian applications or to equip a large number of sites.

In an attempt to tackle these issues, the OhmPi project was initiated to provide an alternative open-source, open-hardware resistivity meter to the community, which main purpose is an enhanced acquisition flexibility. Relying on low-cost components and devices, and using a low-power injection module (0-50V), OhmPi is specifically designed for small-scale field experiments. Developed as an open-source project, new collaborations are warmly welcomed.

We will present early results of a test monitoring of soil-plant interactions in a forested area at the Rochefort Cave Observatory (Belgium). It comprises 6 months of 3D daily measurements on 64 electrodes installed in a 40x60 cm grid covering a 6.0 x 1.8 m surface area centred on a young beech tree. This dataset allows us to investigate changes in resistivity associated with locally variable moisture content associated with the tree activity. While this example doesn't strictly lie in an agricultural context, it illustrates the applicability and transferability of OhmPi to similar agro-geophysical applications.

Keywords ERT, instrumentation, open-source, tree roots, forest experiment

Poster Presentation

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