Open Access | https://doi.org/10.62329/AAAD0745

AGROGEO

# Monitoring soil compaction during a controlled irrigation experiment using multiple hydrogeophysical data

**Alberto Carrera**[1], **Luca Peruzzo**[1], **Benjamin Mary**[2,1], **Giorgio Cassiani**[1], and **Francesco Morari**[1]

[1]University of Padova, [2]ICA-CSIC

## Abstract

Characterizing the spatio-temporal dynamics of water flow in compacted soils poses a significant scientific challenge. Indeed, soil compaction resulting from inappropriate agricultural practices impacts not only the ecological functions of the soil, but also decreases the water-use efficiency of plants by reducing porosity and increasing water loss through superficial runoff and enhanced evaporation. Recognizing these issues in parallel to the demands to mitigate water quantity in irrigated farming underscores the major socio-economic impacts and the importance of addressing soil compaction for sustainable water management in agriculture.

Here we present a controlled infiltration test on a site with different levels of experimental compaction, which was monitored using both electrical resistivity tomography (ERT, 2d and 3d) and frequency domain reflectometry (FDR) sensors. Furthermore, we want to show how a well-designed ERT measurement scheme which fully exploits borehole and surface electrodes can improve the information quality conveyed by the acquired datasets and, coupled with an accurate error analysis, processing and timelapse-inversion, could delineate distinct infiltration fronts with respect to the soil compaction level. To infer the key system parameters controlling the irrigation infiltration, observations will be fused into a coupled hydrolo-geophysical model using a surface-subsurface water flow scheme.

**Keywords** ERT, soil compaction, plant water use, field experiment, coupled inversion

**Poster Presentation**

**Published** Feb 02, 2024

**Correspondence to**
Alberto Carrera
alberto.carrera@phd.unipd.it