

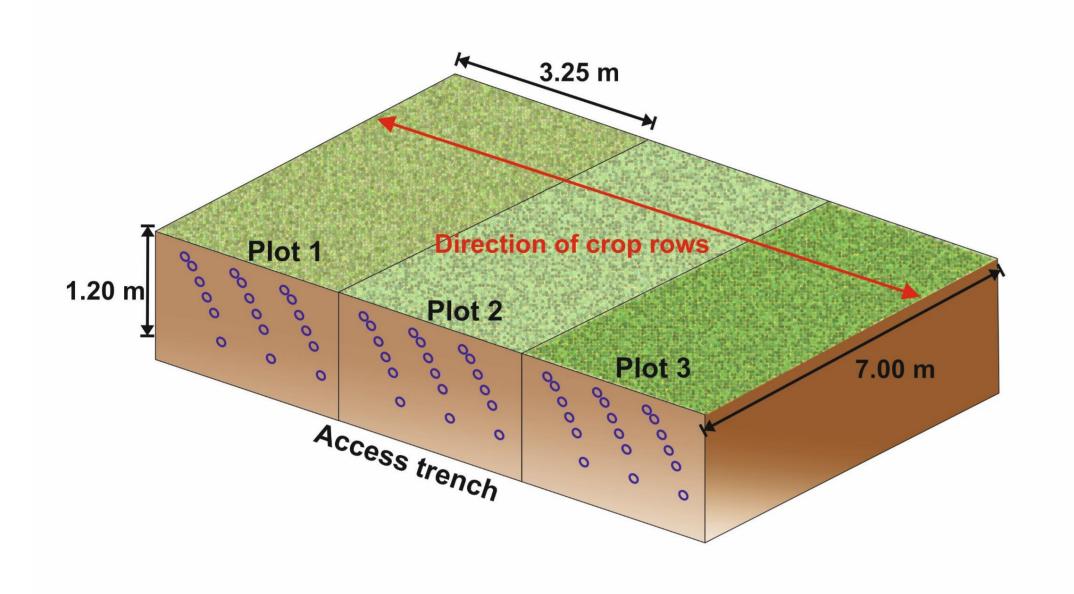
### The Selhausen Minirhizotron Facilities:



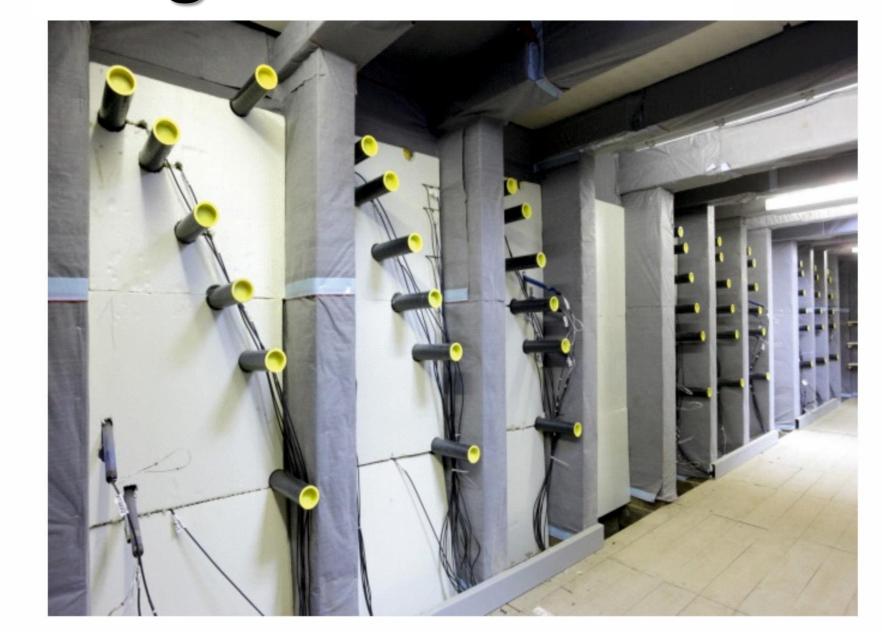
A Unique Set-Up to Investigate Subsoil Processes within the Soil-Plant Continuum

Felix Maximilian Bauer, Lena Lärm, Normen Hermes, Harry Vereecken, Jan Vanderborght, Andrea Schnepf, and Anja Klotzsche

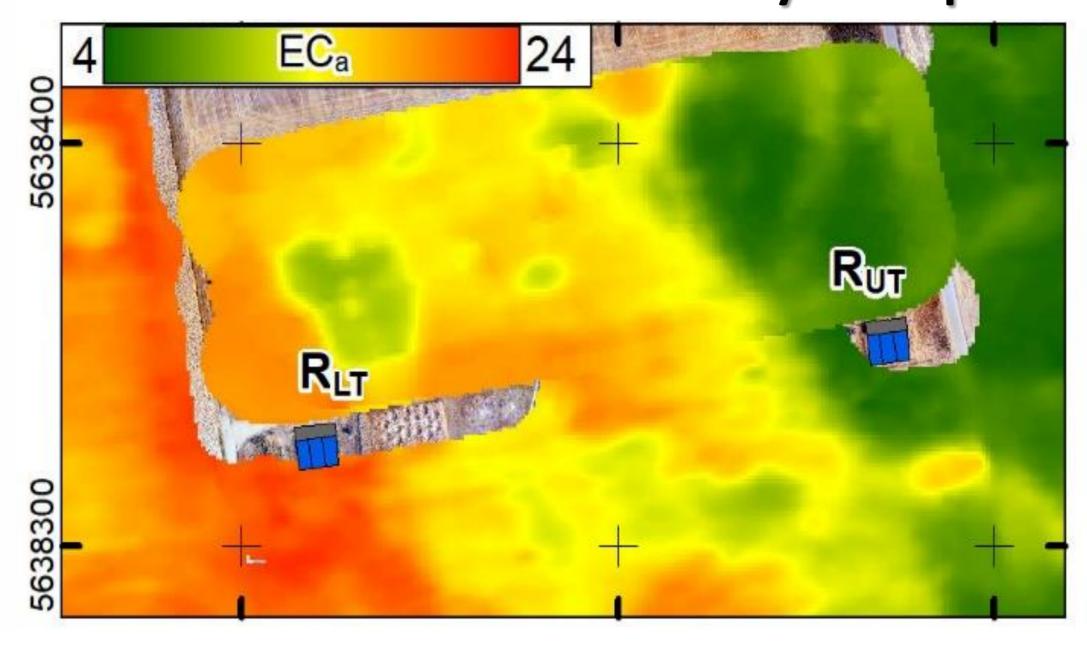
### Field set-up



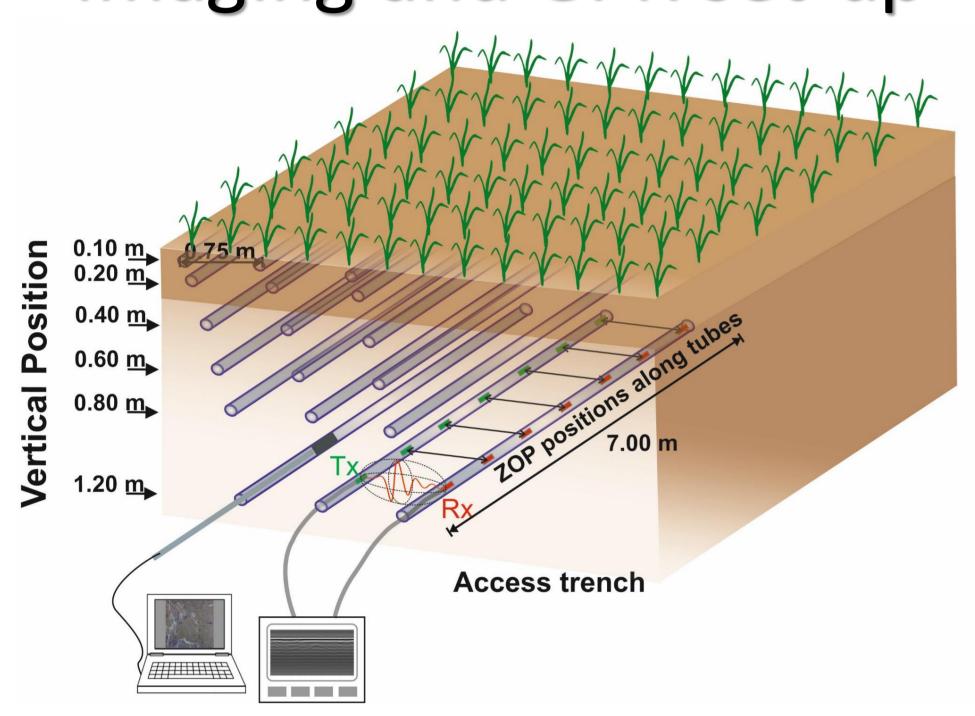
### Insight view



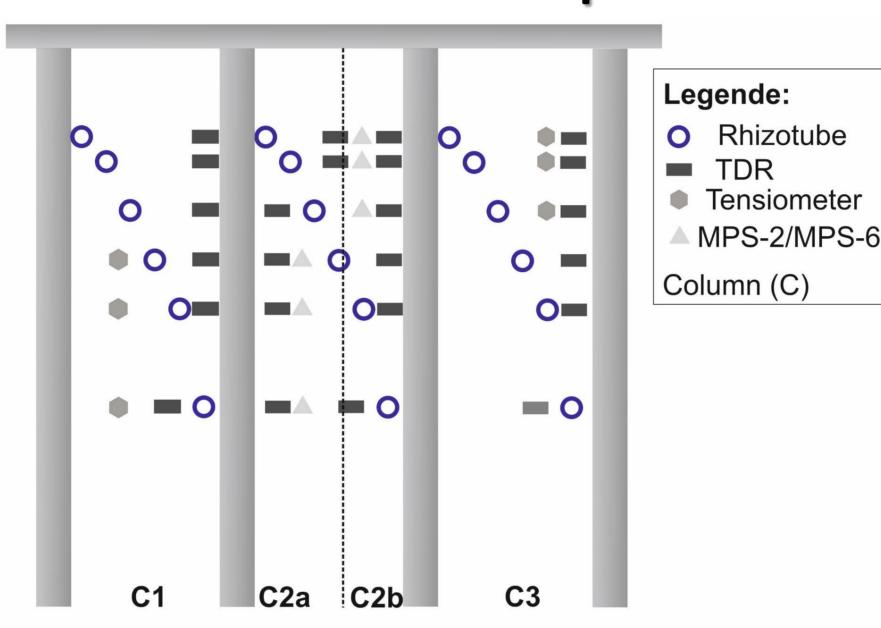
### Electrical conductivity map



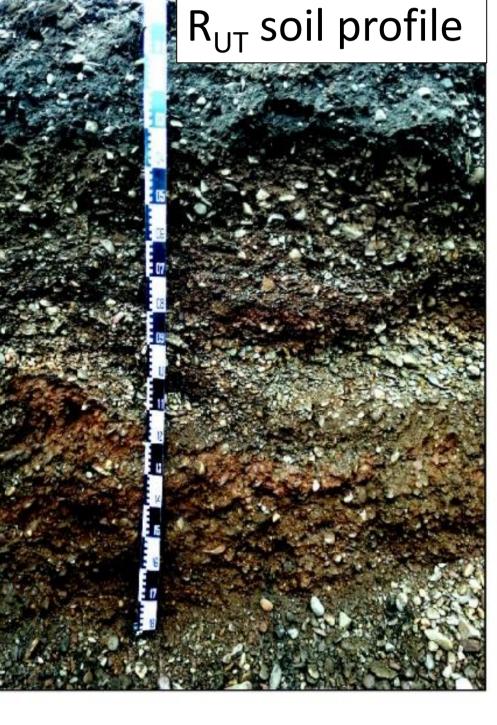
### Imaging and GPR set-up



### Soil sensor set-up



R<sub>LT</sub> soil profile



Root Image Processing Image acquisition in the minirhizotron facilities with in-house camera system

Training of a
Convolutional Neural
Network (CNN) with
RootPainter

Automated batch segmentation of images with the previously trained CNN

Automated feature extraction with RhizoVision Explorer

Feature analysis: Total root length, root diameter, surface area, ...

GPR
Data
Processing

Signal processing:
Dewow filter,
Time-zero correction,
First break estimation
for each ZOP position

Calculation of travel times

Calculation of EM velocity

Calculation of horizontal permittivity planes

Irrigation

Calculation of soil water content from permittivity (Topp or CRIM)

# riment timeline

2016 2015 harvest Triticum aestivum cv. Ambello Dec Herbizide 50 kg N 60 kg ha<sup>-1</sup> N Insectcide 2016 60 kg ha<sup>-1</sup> K<sub>2</sub>O 30 kg ha<sup>-1</sup> P<sub>2</sub>O<sub>5</sub> 2017 harvest sowing Zea mays cv. Zoey Sep Oct Apr Mar Nov 100 kg ha<sup>-1</sup> N Herbizide 100 kg ha<sup>-1</sup> K<sub>2</sub>O 40 kg ha<sup>-1</sup> P<sub>2</sub>O<sub>5</sub> 2017 2018 Zea mays cv. Zoey Mar Oct Dec **l** Feb Nov 2018 2020 sowing harvest sowing Zea mays: Plot1 -> cv. Sunshinos, Plot2 -> mixture, Plot3 -> cv. Stacey Nov Apr Oct Feb 40 kg ha<sup>-1</sup> P<sub>2</sub>O<sub>5</sub> 80 kg ha<sup>-1</sup> N 2020 40 kg ha<sup>-1</sup> K<sub>2</sub>O 2021 harvest sowing Triticum aestivum: Plot1 -> cv. Milaneco, Plot2 -> mixture, Plot3 -> cv. Trebellier Oct Sep Pesticide Drought stress experiments 50 kg ha<sup>-1</sup> N 50 kg ha<sup>-1</sup> N Sowing density and planting density experiment Fertilization

## The article "Multi-year belowground data of minirhizotron facilities in Selhausen" with all data open access

with all data open access will soon be available at *Sci. Data* 





Member of the Helmholtz Association

Crop mixture experiments