

## Topic: Advances in Measuring and Modelling Soil Processes

### **Soil structure changes over time, and it matters!**

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The emergence of alternative agricultural practices aims to create sustainable production systems to meet future dietary needs. These practices and climate changes (Linnerooth-Bayer et al., 2015) will affect soil structure and hydraulic properties (Chandrasekhar et al., 2018). However, most models do not consider changes in hydraulic properties over time, leading to incorrect decisions. Therefore, understanding these changes is crucial.

This study aimed to monitor the temporal evolution of hydraulic properties in three innovative production systems up to 90 cm depth. The project focuses on the value and resilience of innovative rotation systems (vegan, agro-ecological, off-soil). For this purpose, different theoretical water retention curves (WRCs) such as pedotransfer functions (PTFs) (HYPRES and ROSETTA 1,2,3 and EU-HYDI) were evaluated and compared. The EU-HYDI WRC were then compared with i) experimental WRC determined by an evaporation method (Schindler et al., 2006); ii) continuous measurements taken *in situ*.

Results showed that theoretical EU-HYDI WRCs were overestimated, and there were technical limitations in visualizing soil dynamics below the sensor threshold. Continuous measurements were analysed for each plot's three horizons (30, 60 and 90 cm) at different time scales, highlighting the impact of annual rainfall on the soil retention profile and the influence of agronomic itineraries. A comparative analysis of WRC and yield was performed. The communication will present the first results.

### **Bibliography:**

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### **Key words:**

Soil properties and indicators, long-term experiments, innovative measurement methods.