Soil structure changes over time, and it matters !

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1. Context & Project

- Temporal variations are poorly studied and rarely considered in models
- Mostly investigated using single-time measurements, leading to inconsistent results
- Monitor the temporal evolution of hydraulic properties in 3 innovative production systems down to -90 cm depth.

The systems are pesticide-free and have long-term rotations of 8 years with intercrops :

1: animals out of soil with importations and exportations (reference)

2: animals in an agro-ecological interaction with grazing periods

3: animal-free and considered vegan

2. Method

Theorical WRCs (EU-HYDI ver1) | **Experimental WRCs (evaporation method)** | **Continuous measurement *in situ***

→ **Comparison of the methods**

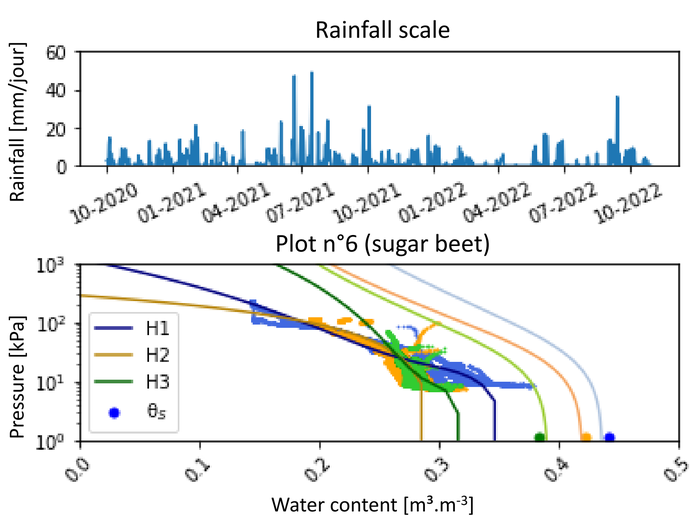
→ Visual | Mathematical

+ analysis of the evolution against tillage operations and major rainfall events

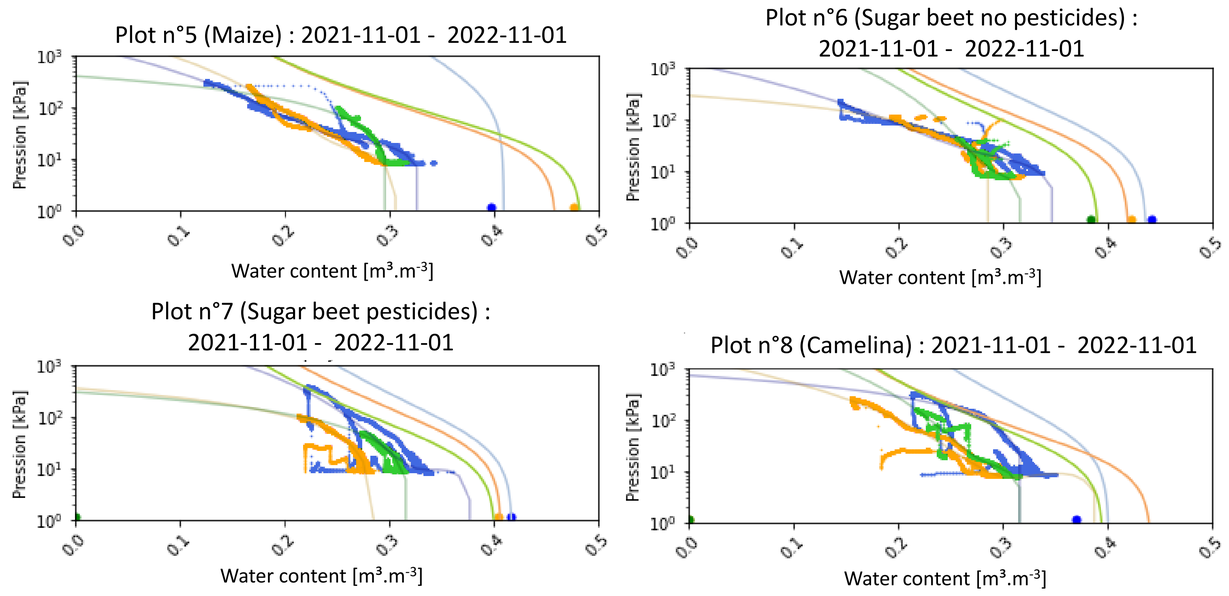
3. Results

2-years period

Dynamic view :

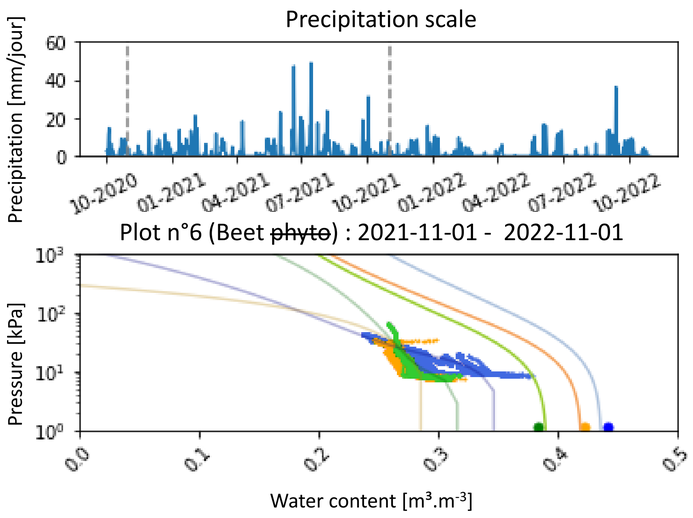


Agronomical systems

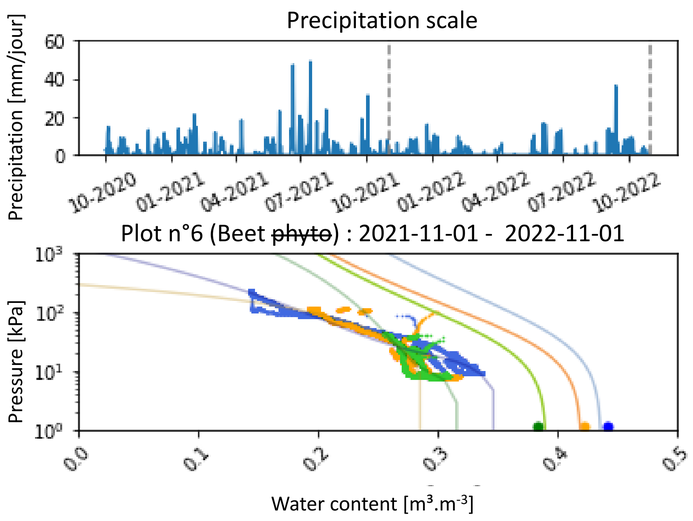


Contrasted years

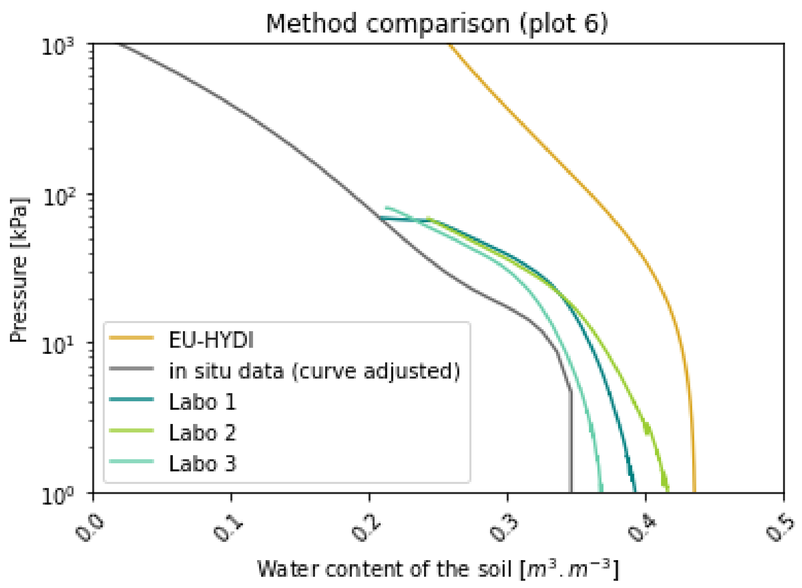
2020-2021 :
wet year and floodings



2021-2022 :
dry year and droughts



By method



*Labo = evaporation method

4. Conclusions

- Theoretical overestimation
- Technical inability: sensor limit at -9 kPa (in situ)
- Intermediate position of laboratory data
- Significant annual impact of rainfall
- Impact of agricultural itinerary persists over time

Significant differences appear between the retention curves estimated or measured in the lab and what we observed in the field. Structure evolution and actual hydrodynamic behaviour of the soils remain a challenge to monitor. However these data show that agricultural practices lead to rather contrasting water status in the soil and therefore show that agriculture has an interesting potential to contribute to food system resilience against Climate change.