



SOPHIE @ WSC19

**Towards a benchmarking between labs
for SHP measurements**



Challenge for soil physics labs

- ▶ Soil physics laboratories aim to quantify the hydrophysical properties of soils (like a.o. retention and conductivity)
- ▶ These properties are mainly structure-dependent
- ▶ There is no guarantee that two laboratories would give the same result on the same soil

- ▶ The challenge of soil physics is to work on **undisturbed samples**
- ▶ **SOPHIE demonstrates the need for interlab comparison**



How to build an interlab comparison?

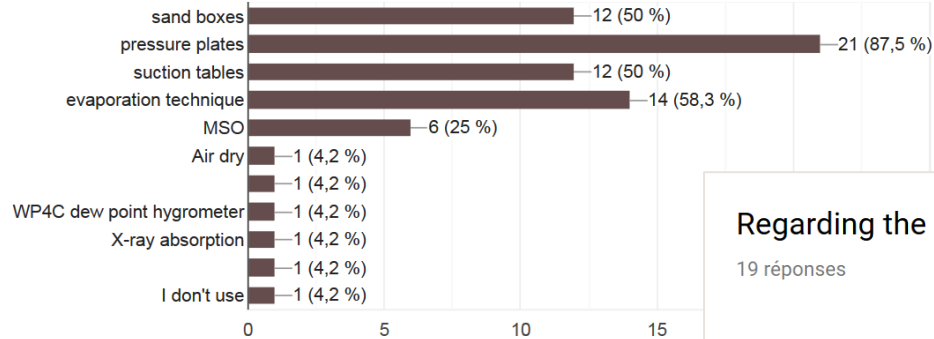
- ▶ Late 2018, we launched a survey in the SOPHIE network in order to know
 - the methods used for the 2 main SHP characteristics
 - If they were some quality control



Survey among the labs

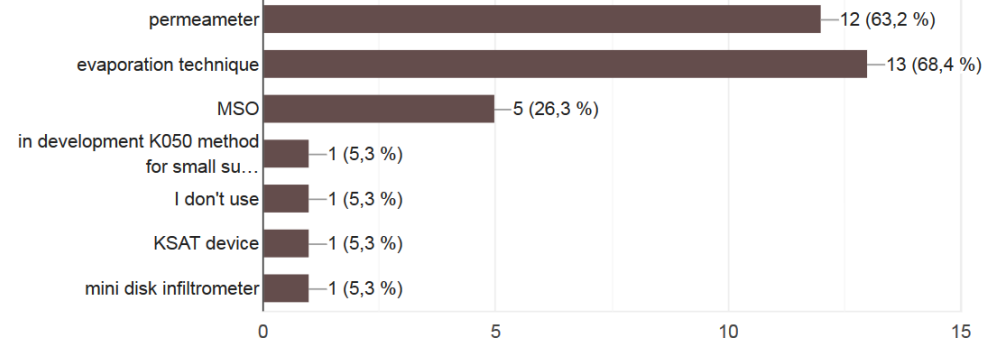
Regarding the retention curve, do you use

24 réponses



Regarding the conductivity curve, do you use

19 réponses

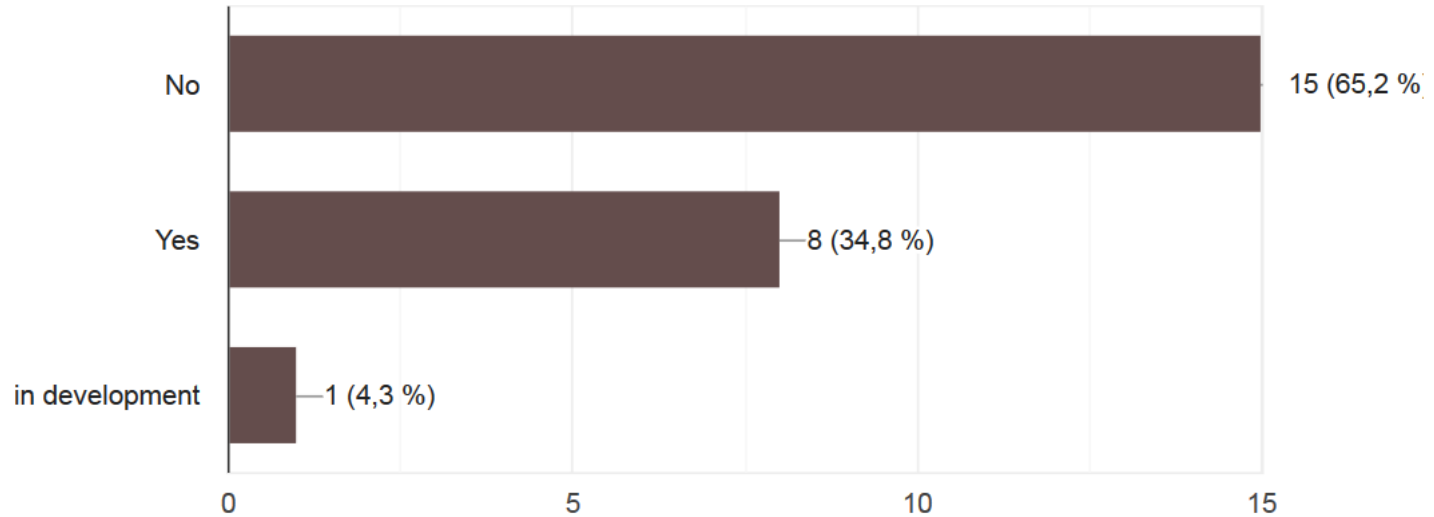


Survey among the labs



Do you use standard samples or methods to control the quality of your measurements in the laboratory?

23 réponses





Survey among the labs

- ▶ Only one lab was using reference samples on a regular basis
- ▶ 4 labs presented ongoing tests/reflexions
- ▶ All the labs were rather small entities (0 to 3 people, asking for common work)

- ▶ Open questions were about
 - Sample size
 - Full saturation
 - Bottom condition
 - Evolution of the samples during the measurement



After Gembloux meeting we identified 3 issues with increasing levels of complexity

- ▶ To ensure the **reproducibility** of a given protocol, over time, within a laboratory;
- ▶ To ensure **consistency** between analyses performed using the same protocol in different laboratories;
- ▶ To ensure consistency (**harmonization**) between similar hydro-physical characterizations performed with different protocols in different laboratories



It became obvious that we needed

- ▶ Reference samples
 - After a quick benchmarking, we identified a good candidate thanks to UGent (Wim Cornelis and Maarten Volckaert)
- ▶ A (several) ring test(s)

It also opened the question of the sensitivity of the models to the differences that might be observed between labs but that goes back to the big picture of SOPHIE



Wet end of the WRC - 1st ring test (ever)

- ▶ Rings provided by Eijkelkamp
- ▶ Reference sample¹ & « recipe » provided by Ugent
- ▶ 14 labs involved



¹ mix of glass beads and cement



Participants

- ▶ Wageningen UR, The Netherlands
- ▶ University of Liège - Gembloux Agro-Bio Tech, Belgium
- ▶ Ghent University, Belgium
- ▶ UCLouvain, Belgium
- ▶ Institute of Research for Development (IRD), France
- ▶ Technische Universität Braunschweig, Germany
- ▶ University of Hohenheim, Germany
- ▶ Forschungszentrum Jülich GmbH, Germany
- ▶ Federal Institute for Geosciences and Natural Resources, Germany
- ▶ Aarhus University, Denmark
- ▶ SLU (Swedish University of Agricultural Sciences), Sweden
- ▶ Norwegian Institute of Bioeconomy Research, Norway
- ▶ Polish Academy of Sciences (PAS), Poland
- ▶ Hungarian Academy of Sciences, Hungary



Wet end of the WRC - 1st ring test (ever)

- ▶ Saturation
 - Saturation time: 48h (in box with water: water level incrementing at regular time intervals with 2 cm steps)
 - Water used: demineralized water
 - Presence of a bottom cloth: yes
 - Presence of a lid: yes
- ▶ mass measurement at 4 points of the retention curve
 - Equilibration time :
 - › 10 hPa : 5 days -> mass measurement
 - › 50 hPa : 7 days -> mass measurement
 - › 100 hPa : 10 days -> mass measurement
 - › 300 hPa : 15 days -> mass measurement
- ▶ drying :
 - 72h at 60°C
 - mass measurement



Wet end of the WRC - 1st ring test (ever)

- ▶ 3 rounds of measurements, 84 samples

From lab 14

	1st round		2nd round		3rd round	
lab	ring	send to lab	ring	send to lab	ring	
1	79	keep	79	keep	79	
1	80	keep	80	keep	80	
1	81	2	21	2	69	
1	82	2	22	2	70	
1	83	2	23	14	83	
1	84	2	24	14	84	

Are the measurements on a same sample stable in a given lab?

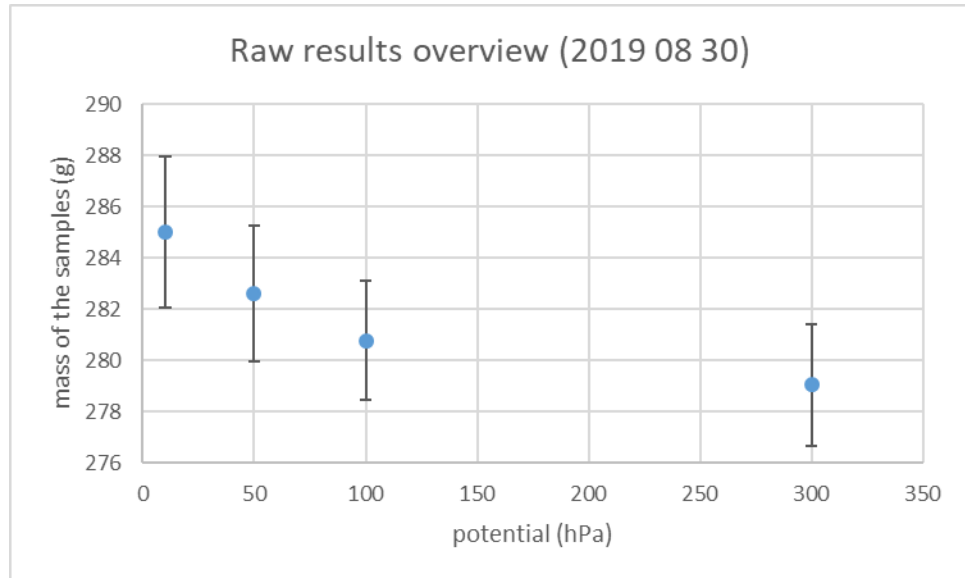
Are the samples affected by transfers between labs?

Are same samples giving the same data in different labs?



State of affairs

- ▶ Labs received the samples in June
- ▶ Today, 4 labs already finished the first round, the others are on their way,
- ▶ Since samples travel between labs, the second round will start when the last lab finishes
- ▶ A round lasts for 40 days





What we learned so far

- ▶ Soil physics is all about patience
 - The community should work on new approaches to improve soil hydrophysics characterisation



What we learned so far

- ▶ Some problems occurred during reference samples construction
 - Loss of material
 - Cracks
- ▶ 4 samples (out of 36) seem to be out of range in 4 different labs



Foreseen schedule

- ▶ End of the first ring test ever : EGU 2020
- ▶ Collaboration with Wepal for another ring test focusing on dry-end of the WRC

Want to join for the next step?

More ideas?

Welcome !