

# SOPHIE: January 30, 2019 in Gembloux

List of participants (see drive)

Presentation (see drive)

Soil physics laboratories aim to quantify the hydrophysical properties of retention and conductivity essentially. Analysis of texture and global properties such as bulk density are also mentioned. However, the texture does not require samples in preserved structure and can therefore be subjected to ring tests comparable to those carried out for chemical soil characterisation. The challenge of soil physics is to work on undisturbed samples.

The working group aims to identify techniques in order:

- 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 between hydro-physical characterizations performed with different protocols in different laboratories.

These issues, which are progressively more complex, are only partially addressed at this stage in a large minority of laboratories.

## **1/ To ensure the reproducibility of a given protocol over time within a laboratory**

For a known object, whose measured property is assumed to be stable over time, repeat this measurement. Calculate the mean value of the observations ( $m$ ), calculate the standard deviation of the observations ( $SD$ ).

- If measurement between  $m \pm 2SD$ , valid measurement
- If measurement outside  $m \pm 2SD$  but in  $m \pm 3SD$ , warning
- If measurement outside  $m \pm 2SD$  but in  $m \pm 3SD$  more than 3 times in a row, error
- If measurement outside  $m \pm 3SD$ , error

## **2/ Ensure consistency between analyses carried out using the same protocol in different laboratories**

The protocol referred to in the previous point may be used, and the means and standard deviations compared between laboratories may be used as well, provided that a similar sample is used.

- WEPAL can provide similar disturbed samples for moisture content measurement at 1500kPa
- Wim and Maarten provide the protocol for the constitution of the glassbeads/cement samples and each lab constitutes 5 samples
  - o 4 points of the retention curve are measured
    - Saturation time: 48h
    - Water used: demineralized water
    - Presence of a cloth: yes
    - Presence of a lid: yes
    - Equilibration time :
      - 10 hPa : 5 days
      - 50 hPa : 7 days
      - 100 hPa : 10 days
      - 300 hPa : 15 days
    - Drying method: 72h at 60°C
  - o 2 samples are kept, 4 samples are sent to the following lab
  - o 4 samples are received from the previous lab
  - o 2 preserved samples + 4 received samples are reanalyzed

## **3/ Ensure consistency between hydro-physical characterizations carried out with different protocols in different laboratories**

Considering that one of the main uses of soil water retention measurement is the adjustment of a retention curve for hydrodynamic modelling. And considering that the saturation water content ( $\theta_s$ ) is the most sensitive parameter of this modelling, differences between the adjustments only have an impact if the saturation water content varies.

Thus different measurement protocols, as long as they lead to a comparable estimate of the saturation water content, can be considered as equivalent.

- Wim and Maarten send each laboratory a reference sample,
- The laboratories measure the retention curve and adjust a van Genuchten function according to their usual protocol,
- Parameter  $\lambda_s$  is used for the comparison between laboratories.

### **Next steps**

Eijkelkamp accepted to provide rings for reference samples (Hans and Wim)

Wepal accepted to provide a first reference soil for wilting point measurement (technical questions still to be solved regarding border regulations) (Winnie)

### **Next meetings**

Next meeting organized by Martine in Vienna during EGU.

- Might be about the accuracy modelers need for their input data?
- Might be about Ksat/K50 measurements?

Andrzej proposed to host a Sophie meeting in Autumn

Christian and Hanane proposed to host a Sophie meeting beginning of year 2020.