SOPHIE

Soil Program on Hydro-Physics via International Engagement

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Informal research group

6th Meeting of the Global Soil Laboratory Network (GLOSO LAN)
A group strongly rooted in research
Sharing common objectives

SOPHIE supports the realisation of **qualified soil hydro-physics (SHP) data**, highly needed in EU policy making, coming from EU-wide agreed, preferred, and innovated cost-effective laboratory- and field methods, accomplished through international collaboration.

- Soil water retention
- Soil water conductivity
- Texture, structure, shrinkage and swelling, ...
Challenges for soil physics labs

• Hydrophysical properties of soils play a major role in a wide range of societal issues
  • Data need to be reliable
• These properties are mainly structure dependent
  • Labs need to work on undisturbed samples
  • This is a major challenge for proficiency tests
• There is no guarantee that two laboratories would give the same result on the same soil sample

• Need for interlab comparisons and structured reference samples
Scientific agenda

• Ring test on the wet end of the retention curve launched in 2019
• Development/test of standard structured samples
• Scientific exchange and communications
  • 2017 – Brussels – Inspiration meeting – purpose – first strategy
  • 2018 – Rome – introduction at FAO Glosolan pre-meeting
  • 2019 – Gembloux – launch of the ring test on retention
  • 2019 – EGU session - dissemination
  • 2019 – Meeting at the JRC – links with Lucas – refined strategy
  • 2020 – Lublin – texture analysis – experience exchanges on new measurement devices
  • …
  • 2022 – Paris – results of the ring test and links with soil (micro-)biology
1/Ring test on the wet end of SWRC
3 questions, 3 exchange schemes

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

Are same samples giving the same data in different labs?

Are the samples affected by transfers between labs?
Results – Linear model

6th Meeting of the Global Soil Laboratory Network (GLOSOLAN) | 22-24 November 2022
Q1: Are the measurements on a same sample stable in a same lab?

- Intra-lab SDs between 3 SWRCs x 2 samples measured in the same lab.
Q2: Are same samples giving the same results in **different labs**?
### Non-harmonized SOPs

<table>
<thead>
<tr>
<th>Lab</th>
<th>Device</th>
<th>Contact material</th>
<th>Cap</th>
<th>Pressure sample ref</th>
<th>Correction cm to hPa</th>
<th>Plate clean</th>
<th>Saturation</th>
<th>Cooling after drying</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Water type</td>
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<tr>
<td>1</td>
<td>SB</td>
<td>spheriglass 3000</td>
<td>/</td>
<td>middle</td>
<td>/</td>
<td>water + brush</td>
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<td>no</td>
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<td>middle</td>
<td>yes</td>
<td>no</td>
<td>distilled</td>
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<td>SB</td>
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<td>yes</td>
<td>bottom</td>
<td>no</td>
<td>water + brush</td>
<td>demineralized</td>
<td>50 mm</td>
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<tr>
<td>9</td>
<td>SB</td>
<td>no</td>
<td>yes</td>
<td>bottom</td>
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<td>water + brush</td>
<td>tap</td>
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<tr>
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<td>bottom</td>
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<tr>
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<td>no</td>
<td>middle/bottom</td>
<td>no</td>
<td>tap water + brush</td>
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<td>45 mm</td>
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</table>

Sand Box (SB), Suction Plate (SP), Pressure Plate (PP), Sand/Kaolinite Box (SKB)
Q3: Are the samples affected by transfers between labs?

Back samples: Yes
Some conclusions of the ring test

• The Intra-lab variability is highly variable depending on the lab.
• Systematic differences between laboratories account for most of the explained variability (more than samples)
  • Non-harmonized SOPs (from the saturation to the dry weight measurement)
• Our Intra/Inter-lab variability estimates are certainly inflated by sample changes between rounds.

• Paper will be submitted by the end of 2022
2/Reference samples

• Ongoing research
3/ Next steps

• Understand better the impact of non-harmonized operating procedures
• Quantify the consequences of uncertainties
• Open the pandora box of soil water conductivity
• ....
Conclusion

• Sophie is an informal research group on soil physics
  • Available for methodological contributions
  • Happy to present its work to Glosolan members when it is relevant
  • Happy to welcome interested research labs