

# SOPHIE

Soil Program on Hydro-Physics via  
International Engagement

6<sup>th</sup> Meeting of the  
**Global Soil  
Laboratory  
Network**  
(GLOSOLAN)

—  
Informal research group



**GLOSOLAN**  
GLOBAL SOIL LABORATORY NETWORK

A group strongly  
rooted in **research**



6<sup>th</sup> Meeting of the **Global Soil Laboratory Network (GLOSOLAN)** | 22-24 November 2022



# 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



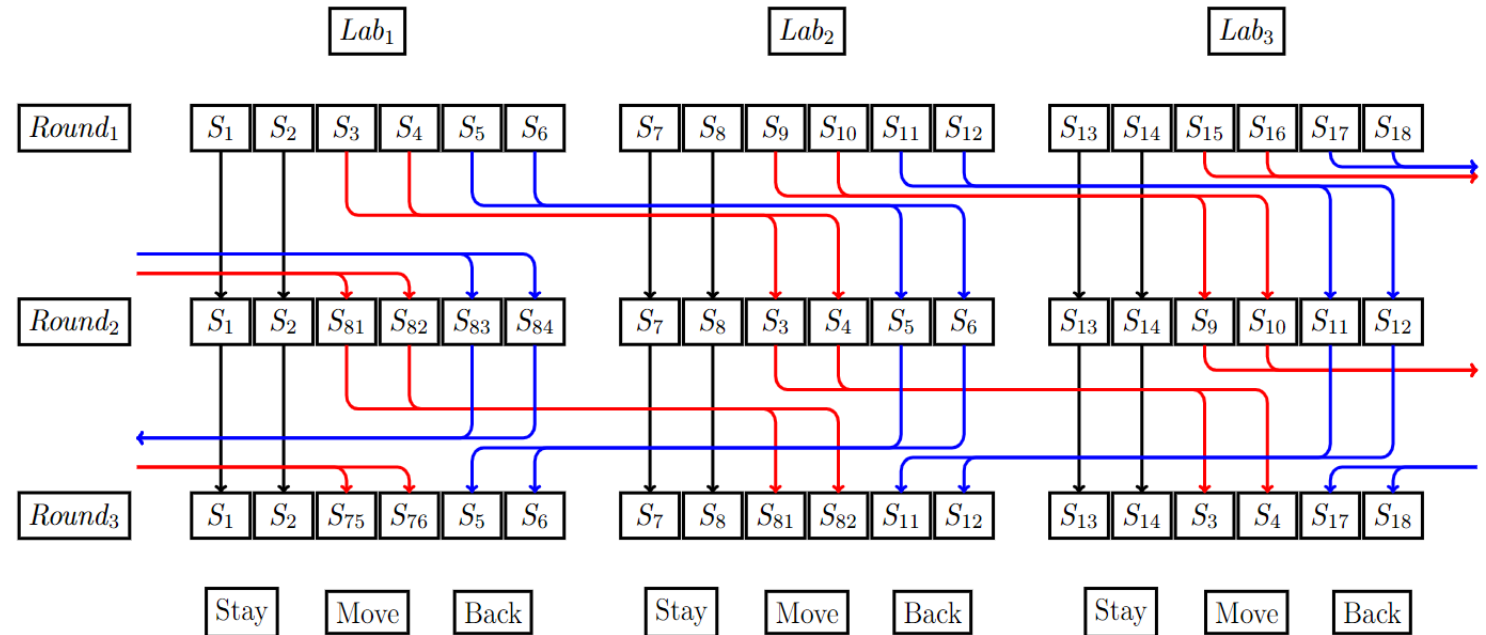
# 1/Ring test on the wet end of SWRC

3 questions, 3 exchange schemes

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

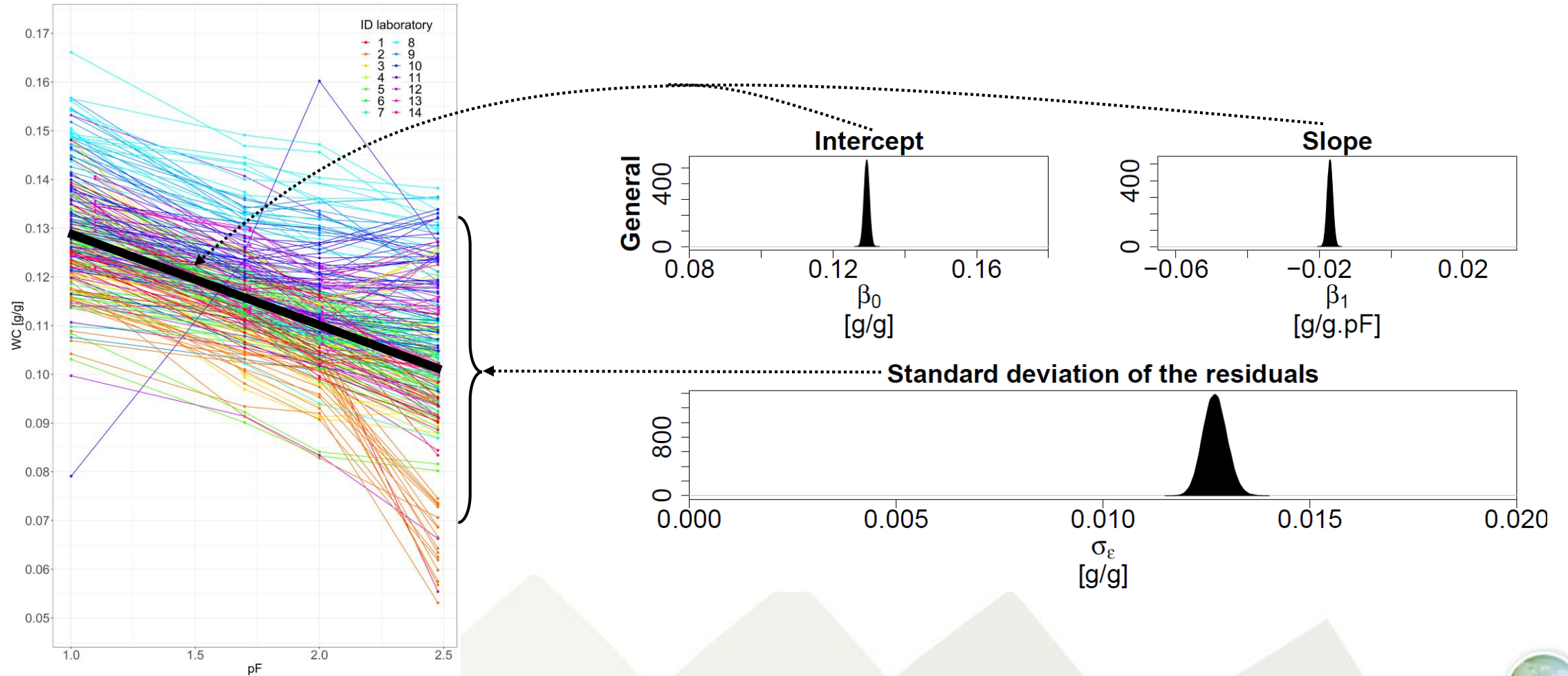
Are same samples giving the same data in **different labs** ?

Are the samples affected by **transfers between labs** ?

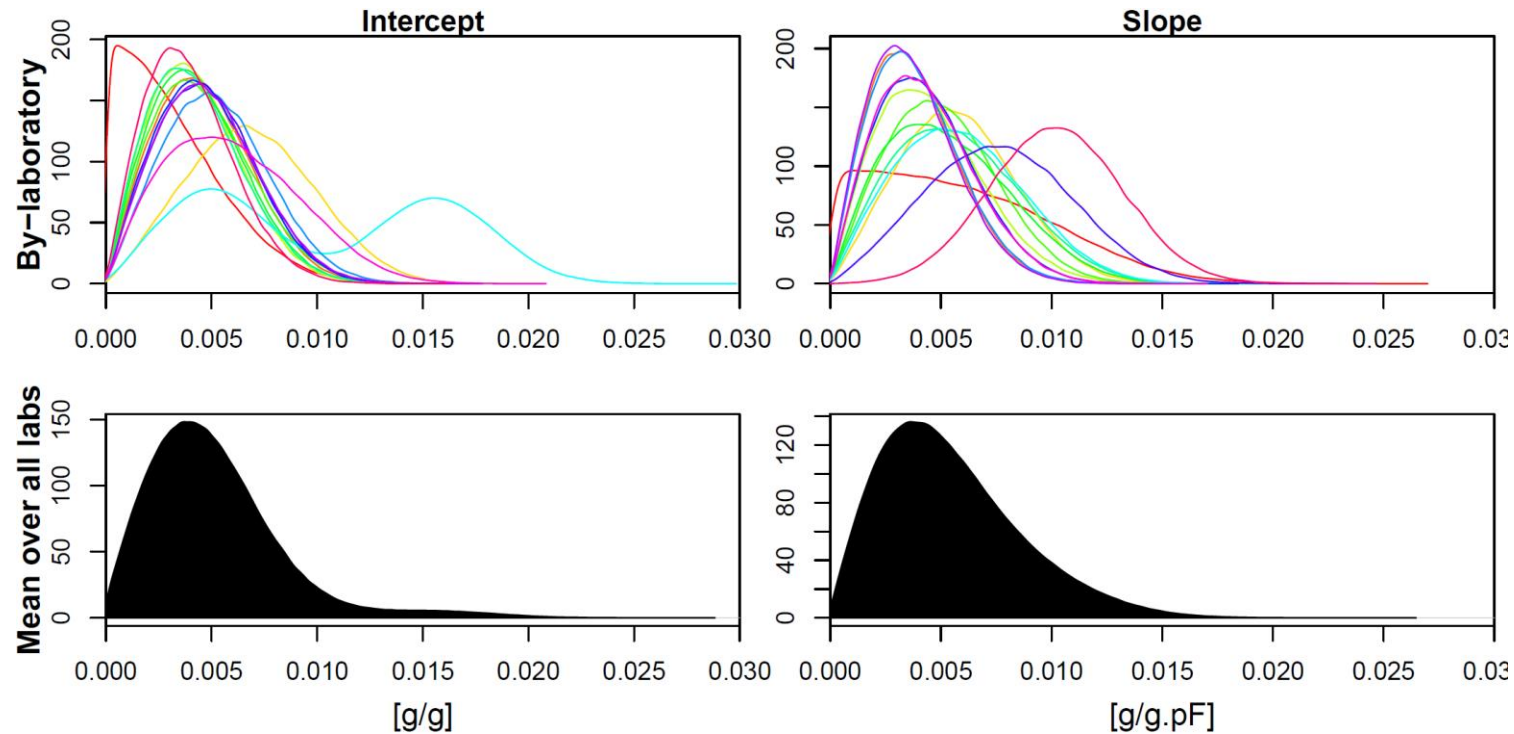


Reference samples based on UGhent quality control practices

# Results – Linear model



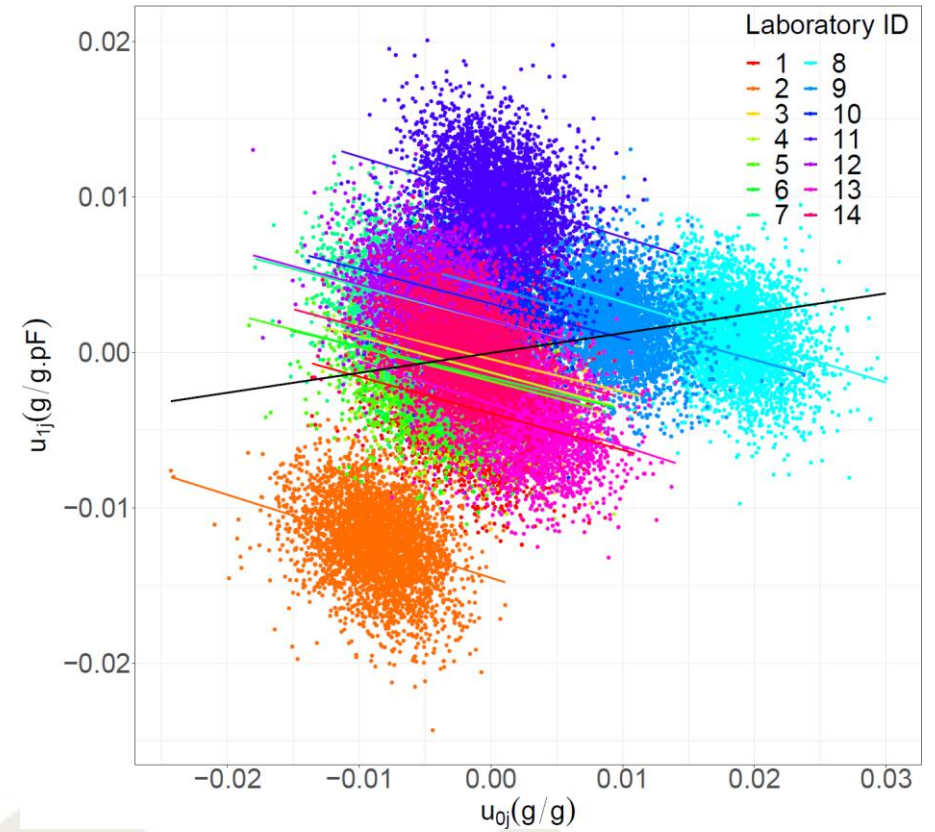
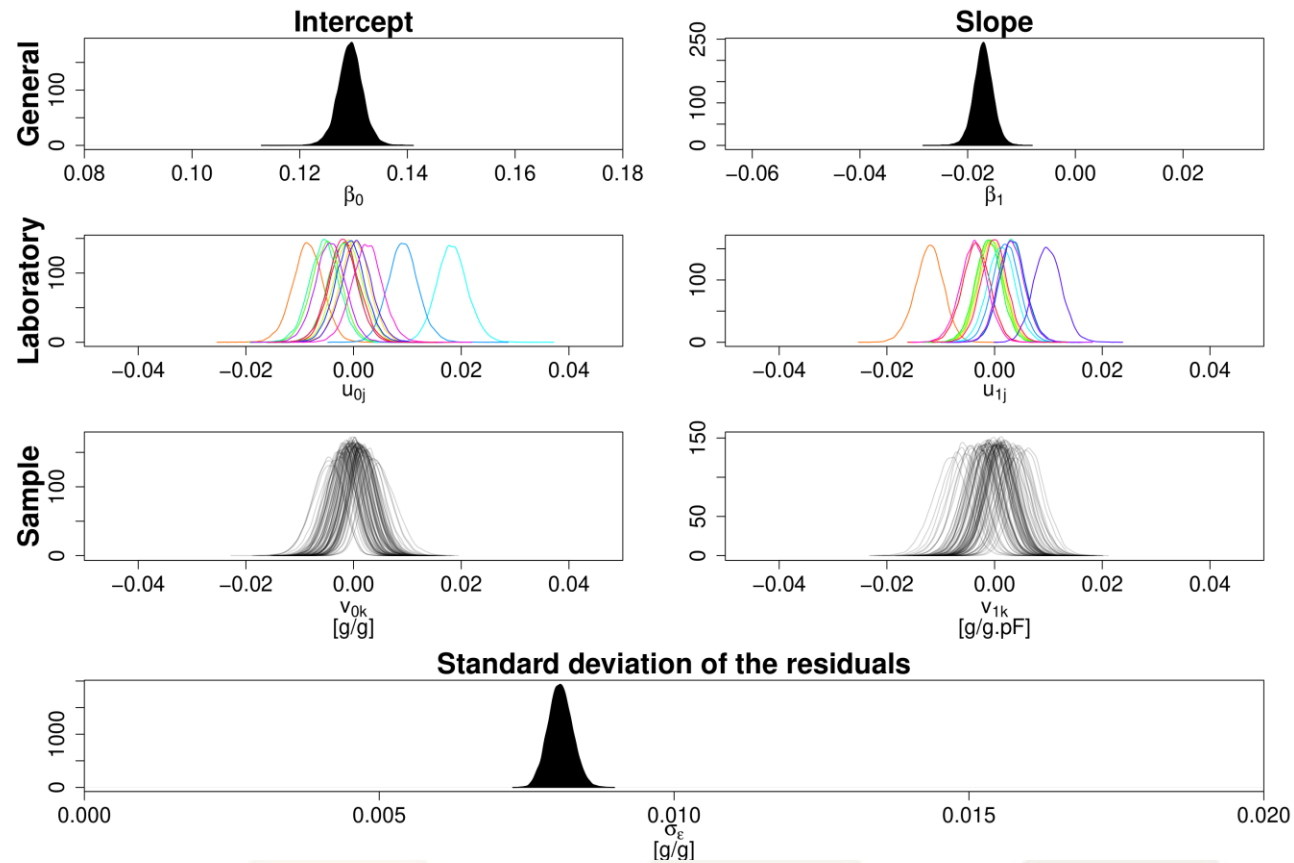
# Q1 : Are the measurements on a same sample stable in a same lab ?



- 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

Lab	Device				Contact material	Cap	Pressure sample ref	Correction cm to hPa	Plate clean	Saturation		Cooling after drying
	10 hPa	50 hPa	100 hPa	300 hPa						Water type	Water level	
1	SB	SB	SB	SP	spheriglass 3000	/	middle	/	water + brush	/	/	/
2	SB	SB	SB	SP	quartz meal	no	middle	no	no	demineralized	45 mm	dessicator
3	SB	SB	SB	PP	no	no	middle	yes	H2O2 + water	demineralized	25 mm	dessicator
4	SP	SP	PP	PP	milled sand	no	middle/unknown	no	water	demineralized	47 mm	NA
5	SP	SP	SP	SP	filter paper	no	middle	yes	no	tap	49 mm	dessicator
6	SB	SB	SB	PP	kaolinite on filter paper	no	middle	yes	light HClO solution	demineralized	49 mm	no cooling
7	SB	SKB	SKB	SKB	no	yes	middle	yes	no	distilled	50 mm	dessicator
8	SB	SB	PP	PP	Kaolinite	yes	bottom	no	water + brush	demineralized	50 mm	no cooling
9	SB	SB	SB	PP	loamy soil	no	middle	yes	water + brush	tap	40 mm	dessicator
10	SP	SP	SP	SP	no	yes	bottom	no	water	distilled	45 mm	NA
11	SP	SP	SP	PP	filter paper	yes	middle	no	water	demineralized	/	NA
12	PP	PP	PP	PP	no	no	middle	yes	water	demineralized	40 mm	in the oven
13	SB	SB	SP	SP	sand	no	bottom	no	water	demineralized	50 mm	in the oven
14	SB	SB	SB	PP	no	no	middle/bottom	no	tap water + brush	demineralized	45 mm	NA

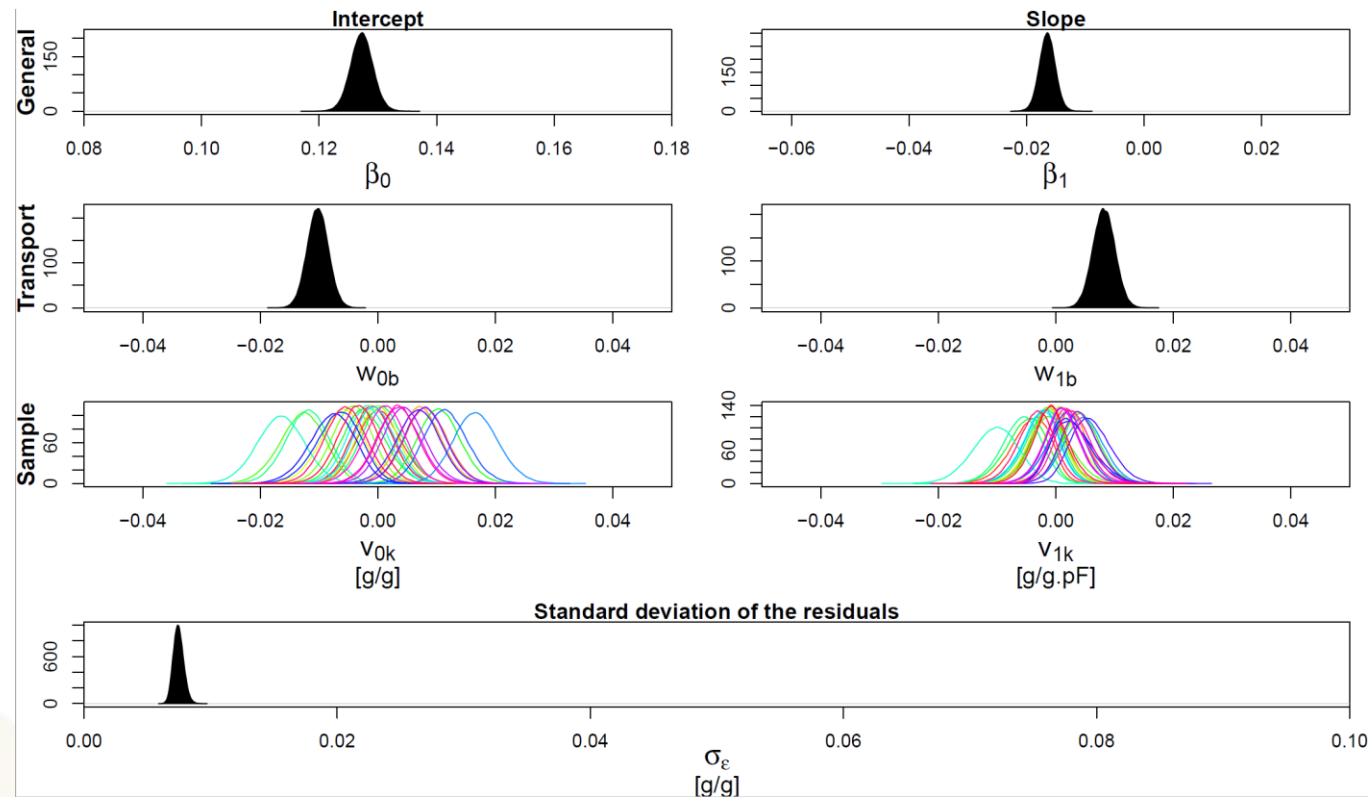
*Sand Box (SB) , Succion Plate (SP), Pressure Plate (PP), Sand/Kaolinite Box (SKB)*

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# Q3 : Are the samples affected by transfers between labs ?

Back samples : Yes



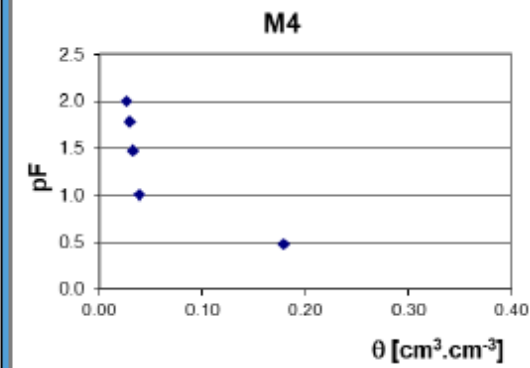
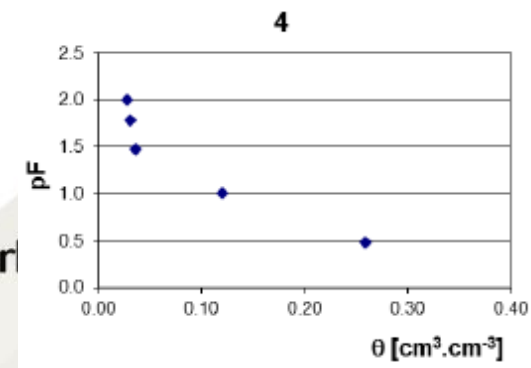
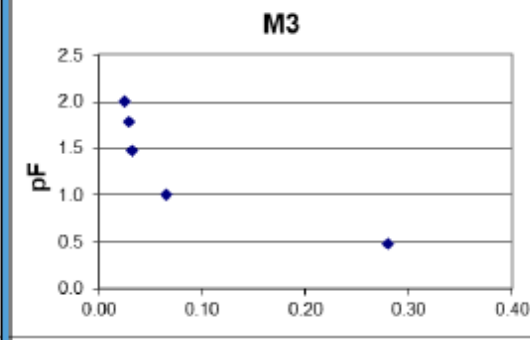
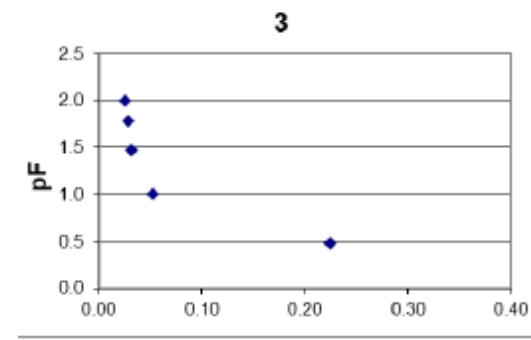
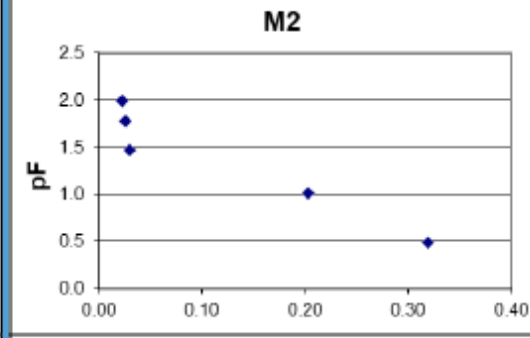
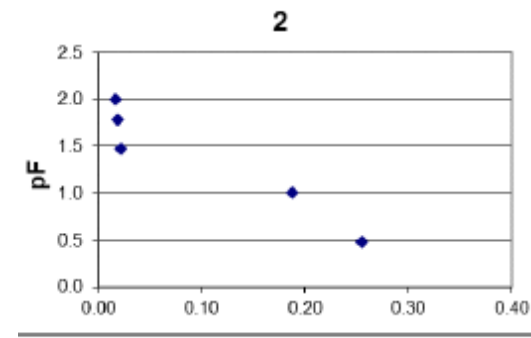
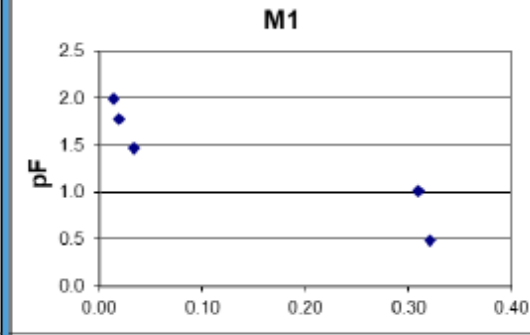
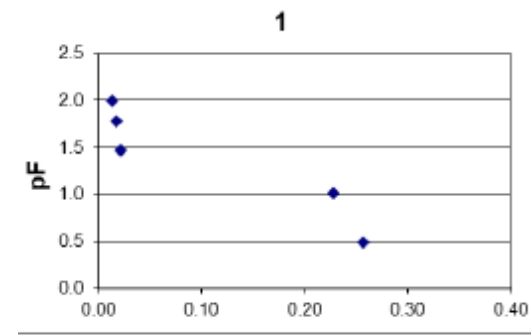
# Some conclusions of the ring test

- 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

G. Bakker WUR



# 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



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Partnership

## Soil Program on Hydro-Physics via International Engagement (SOPHIE)

Downloads:

- + 2019 - ULiege Gembloux Belgium
- + 2019 - EGU Vienna Austria

Do you have a question about SOPHIE? Ask our expert:  
ir. G (Gerben) Bakker

Contact form

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