



Food and Agriculture  
Organization of the  
United Nations

21-23 November 2023

# GLOSOLAN activities in 2023 and future challenges

*Ms. Miriam Ostinelli, GLOSOLAN Chair*

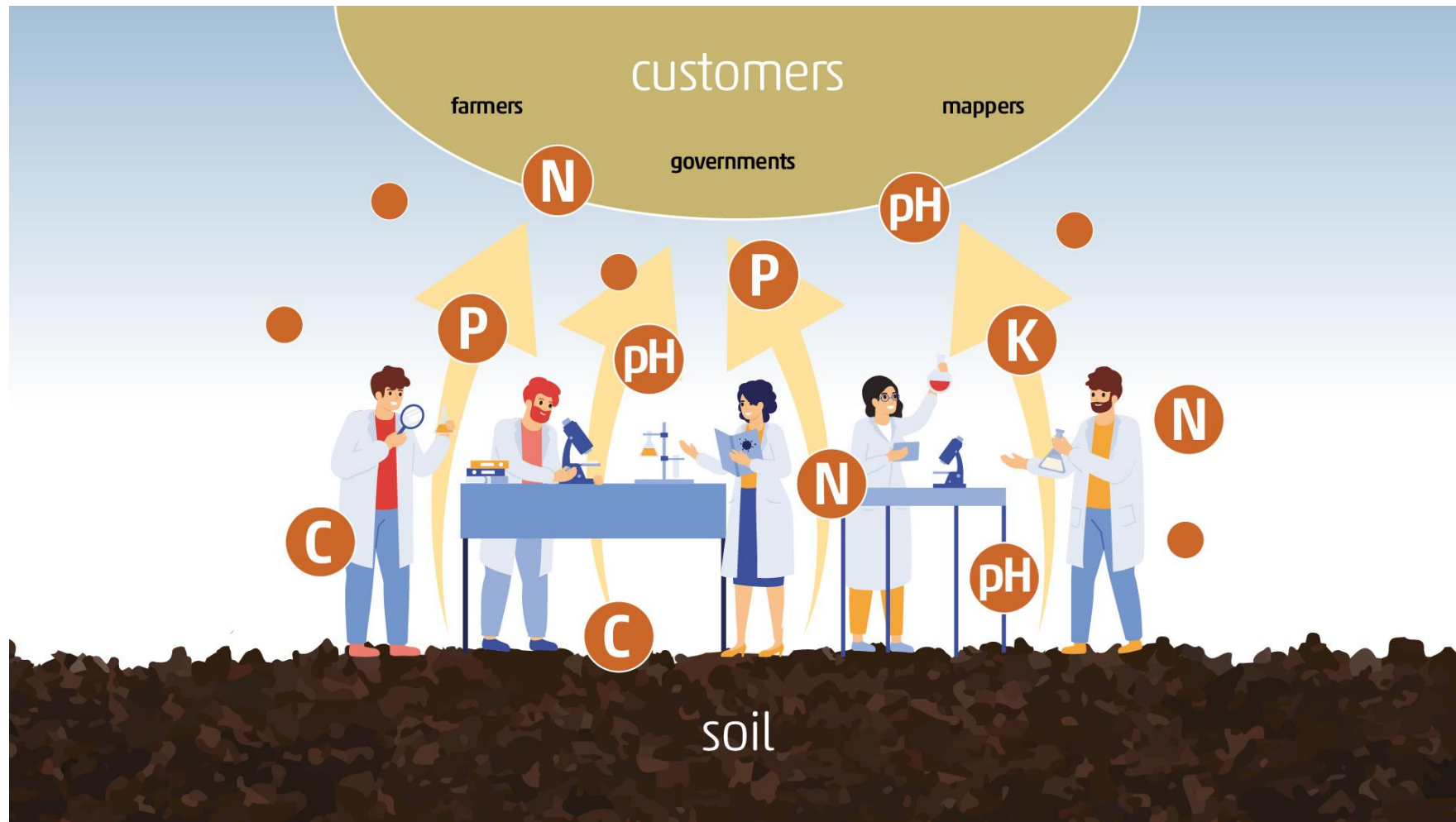
7<sup>th</sup> Meeting of the  
**Global Soil  
Laboratory  
Network**  
(GLOSOLAN)



**GLOSOLAN**  
GLOBAL SOIL LABORATORY NETWORK



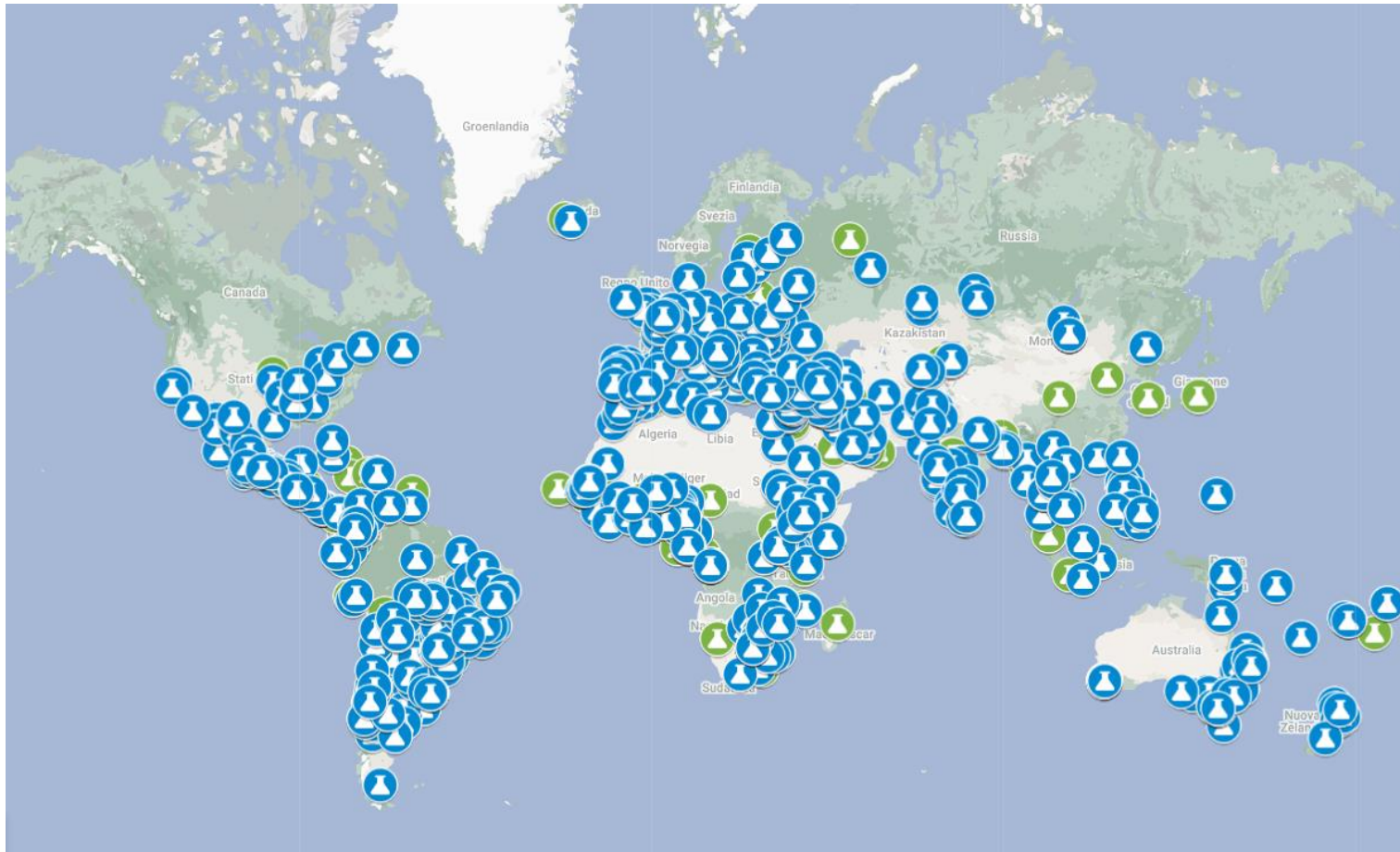
# Soil laboratories: where soil samples become data



7<sup>th</sup> Meeting of the **Global Soil Laboratory Network (GLOSOLAN)** | 21-23 November 2023



# GLOSOLAN: bringing soil laboratories to the forefront worldwide since 2017



Currently grouping together around 1 000 soil testing institutions from around 160 countries



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# We operate at all levels...

**GLOBAL**

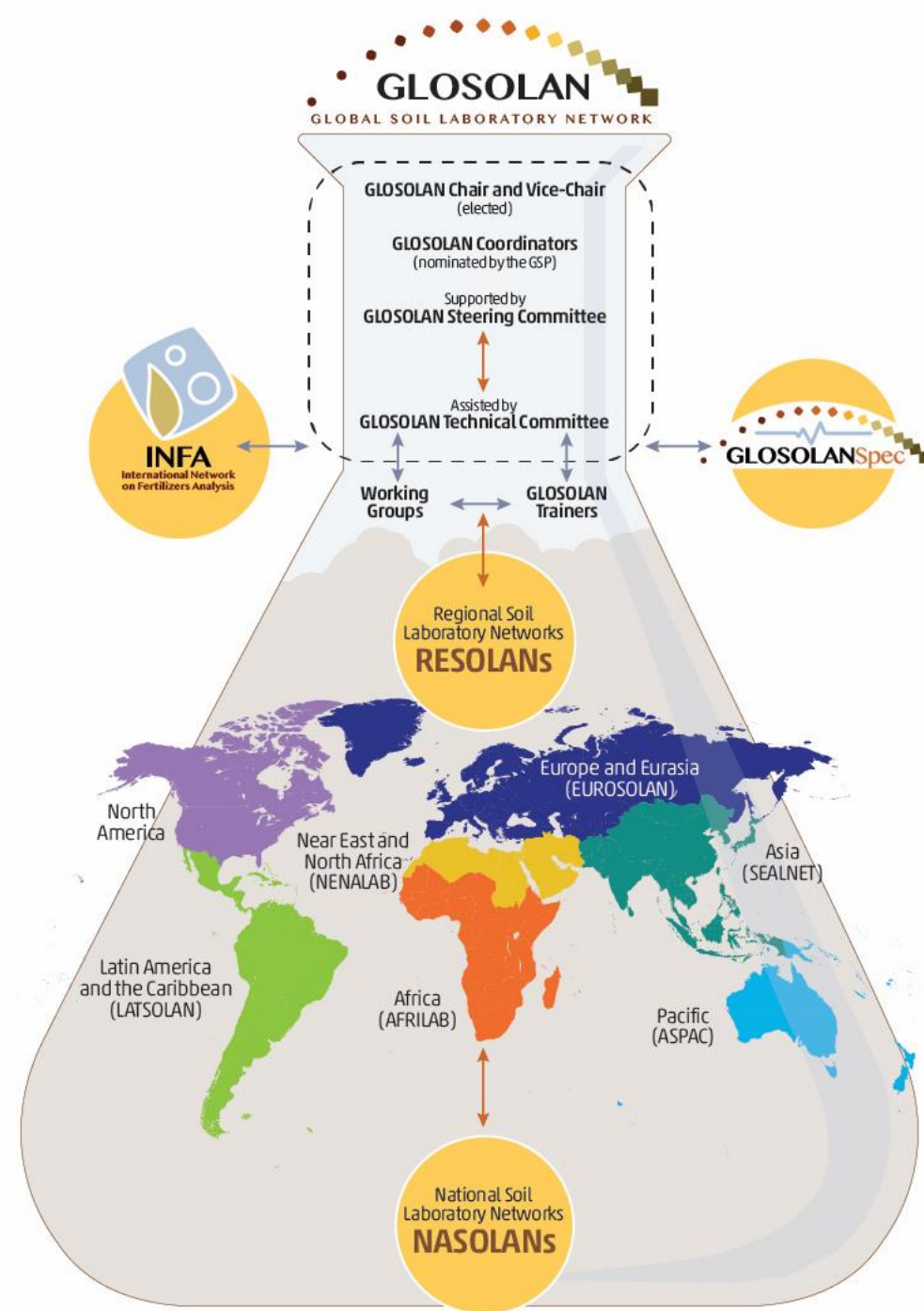


**REGIONAL**



**NATIONAL**

7<sup>th</sup> Meeting of the **Global Soil Laboratory Network**



Collaborative and  
participative  
approach...



... where the most advanced laboratories help those who need to improve

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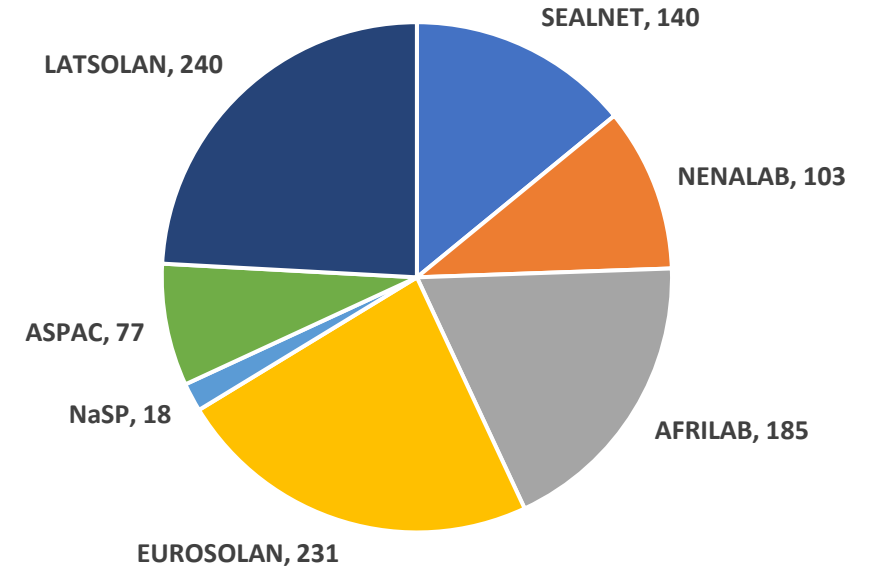


# Status of GLOSOLAN

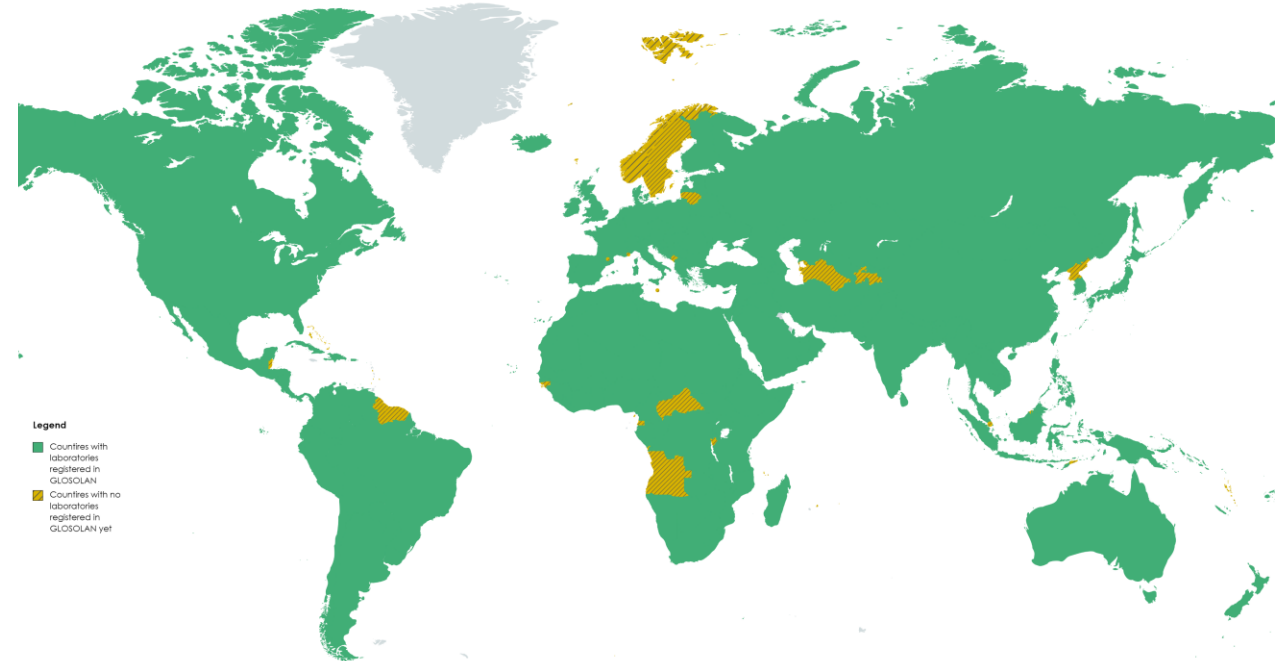
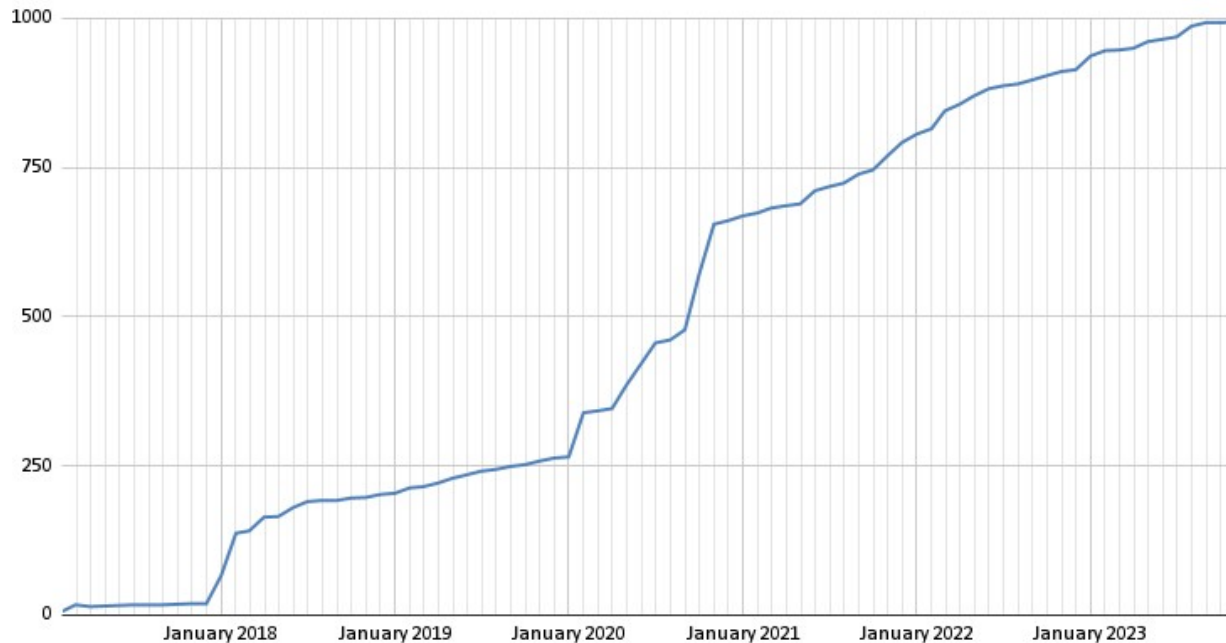
Currently **997** registered soil laboratories from 160 countries

(→ around **3 000** lab heads and technicians involved)

### GLOSOLAN participation by region



### GLOSOLAN growth

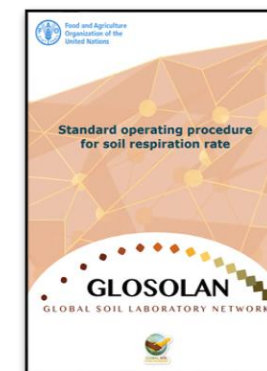
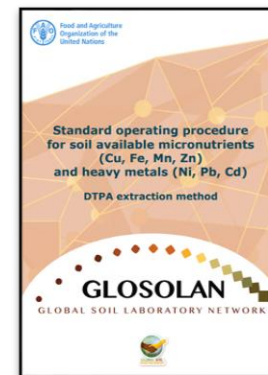


# Harmonization of Standard Operating Procedures (SOPs)



*Globally harmonized protocols, with a bottom-up, collaborative and inclusive approach.*

- Include step-by-step instructions, sections on health and safety, quality assurance and control (QA/QC),
- Contribute to the replicability of an analysis and to the quality and reliability of the data,
- Available online, for free and in several languages.



*New SOPs published in the last months:*

- Soil respiration rate
- Soil moisture by gravimetric method
- Cation exchange capacity and exchangeable bases
- Available micronutrients by DTPA extraction method
- Quasi total elements in soil by acid digestion including heavy metals
- Bulk density

*Under publication:*

- Boron by hot water extraction

*Under final review:*

- Particulate organic carbon by physical fractionation
- Microbial biomass
- Microbial enzyme activities

**Experts from the other GSP Technical Networks supported the harmonization and review of the SOPs from joint working groups**



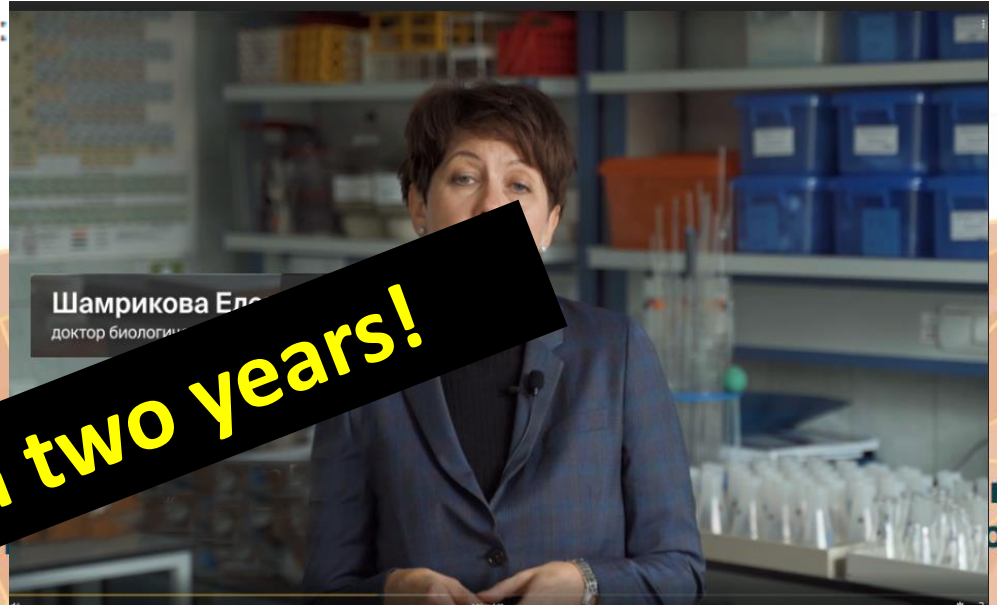
The m



Standards



the following:



Over 10 000 views in two years!

Walkley-Black method  
Titration and colorimetric method

Walkley-Black  
titration and colorimetric method

методом Уокли-Блека  
титрованием и колориметрическим







# Capacity building

- In-person training sessions
  - Djibouti, December 2022
  - Uzbekistan, May 2023
  - Dakar, October 2023
- Many activities ongoing at regional and national scales



*Uzbekistan, May 2023*



*Djibouti, December 2022*



 Food and Agriculture Organization of the United Nations

## Raising confidence in quality measurements from soil laboratories in Sub-Saharan Africa

Dakar, 23-27 October 2023



work (GLOSOLAN) | 21-23 November 2023



# Capacity building

- 4 new webinars implemented in 2023, over 1 000 participants
- New webinar calendar for 2024
- Video training
- Review of FAO Bulletin 74
- Guidelines on reagents disposal

## Several topics covered:

- SOPs implementation
- Quality control and good practices
- Health and safety
- Equipment
- Soil spectroscopy



Actividad del laboratorio y características de la limpieza del mater

10. ¿Controla el resultado del lavado de alguna manera?

Response	Count	Percentage
SI (Yes)	18	36%
NO (No)	32	64%

Considerar:

- ✓ Necesidad de control del lavado
- ✓ Posibilidades de control en cada tipo de ensayo
- ✓ Registro del control
- ✓ Dinámica del trabajo en el laboratorio y eficiencia
- ✓ Costos
- ✓ Ventajas / Desventajas de cada opción

GLOSOLAN workshop on cleaning and washing soil laboratory glassware and equipmen | 7 August 2023

*Webinar on cleaning and washing soil laboratory glassware and equipment (in Spanish), August 2023*

## How to set up a new soil laboratory

Setting up a new soil laboratory is not an easy task as it is rather an overwhelming challenge. As a laboratory manager, when you decide to set up a new soil laboratory, you need to consider not only the laboratory management but also the technical management plan. Below are reported some preliminary steps that you should take into consideration when setting up a new soil laboratory.

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# In-person training on *raising confidence in quality measurements from soil laboratories in Sub-Saharan Africa*

Over 80 soil laboratory technicians from 40 Sub-Saharan countries gathered together in Dakar (Senegal) on 23-27 October 2023



GLOSO

# Ongoing and future inter-laboratory proficiency tests (PTs)

- Launch of 3 regional PTs in 2023:
  - **Eurasia** (led by RUSOLAN, thanks to the support of PhosAgro) – Main topic: CARBON
  - **Asia** (led by the BSWM - Philippines): C, pH, N, P, K, particle size distribution
  - **Africa+NENA** (thanks to the support of BGS and IRD)
- Launch of several national PTs
- Launch of a global GLOSOLAN PT in 2024 (expectations: around 300 labs participating)

Exchange of soil samples for scientific purposes remains a major issues in many countries

- High-performing laboratories have a key role to play in helping and training less successful laboratories on a regular basis
- GLOSOLAN will continue building the capacity of countries to organize PTs and will facilitate the organization of regional/global PTs



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# GLOSOLAN initiative on soil spectroscopy (GLOSOLAN-Spec)



- Primer for soil spectroscopy: to introduce theory and concepts of soil spectroscopy at the beginner level (available in different languages)
- Training in soil spectral modelling in R (six sessions)
- Webinars with spotlight on state-of-art, research and discussion
- Launch of the International Capacity Development Group on Soil Spectroscopy (SoilSpecNet)



## UPCOMING TRAININGS

- Artificial intelligence and machine learning in soil spectroscopic modelling



Artificial intelligence and machine learning in soil spectroscopic modelling  
5 July 2023 | 9:00 CEST

SPEAKERS: Zefang Shen and Raphael Viscarra Rossel  
LANGUAGE: English

[Details of the event](#) | [REGISTRATION](#)

## PAST TRAININGS

- Soil Spectroscopy and Deep Learning-based modeling for decision-making in agricultural contamination



Soil Spectroscopy and Deep Learning-based modeling for decision-making in agricultural contamination  
3 March 2023 | 15:00 CEST

SPEAKER: Franck Albinet  
LANGUAGE: English

[Details of the event](#) | [WATCH the RECORDING](#) | [DOWNLOAD the PRESENTATION](#)

- Towards operational large-scale soil spectral libraries



Towards operational large-scale soil spectral libraries

11 October 2022 | 14:30 CEST

SPEAKER: Leonardo Ramirez-Lopez  
LANGUAGE: English

[Details of the event](#) | [Presentation \(available soon\)](#) | [Video recordings](#)

- Soil sample preparation for MIR measurement. Is fine grinding necessary for accurate MIR predictions?



07 September 2022 | 16:00 CEST

SPEAKER: Dr Nuwan Wijewardane  
LANGUAGE: English

[Details of the event](#) | [Presentation](#) | [Video recordings](#)

- Interpretation of mid infrared spectra of soil - Direct use of spectra to provide new insights

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# Joint work with other GSP Tech. Networks

- Review GLOSOLAN SOPs (biological parameters, salt-affected soils related parameters, heavy metals and pollutants)
- Develop technical documents (e.g., guidelines on reagents disposal)
- Organize together workshop and webinars
- Experts from GLOSOLAN to help other GSP Technical Networks to develop SOPs (e.g. INSOP, INSOILFER) and organize workshop together



# Participation to international conferences

17<sup>th</sup> International Symposium on Soil and Plant Analysis (ISSPA)  
Concepción, Chile – March 2023

- One keynote presentation on GLOSOLAN activities and mission
- Four presentations during the technical sessions on:
  - *GLOSOLAN SOPs: a trigger to face emerging challenges on sustainable soil management worldwide*
  - *Soil laboratories: key players in the development and use of soil quality and health indicators*
  - *GLOSOLAN PTs: how reliable are soil laboratory measurements worldwide?*
  - *The contribution of soil laboratories to the sustainable management of fragile and degraded soils*



7<sup>th</sup> Meeting of the **Global Soil Laboratory**

# Involvement in other GSP initiatives and programs

- RECSOIL (e.g., lab training in Togo)
- SOILCARE project
- SoilFER project





# External collaborations

- FAO Regional Office for Asia and the Pacific: **Asian knowledge hub** - Webinar on soil labs and soil testing kits (7-8 November 2023)
- **ISO**: first discussion on potential cooperation held in October 2023
- GLOSOLAN invited to join the International Governance Committee (**IGC**) for the International Symposium on Soil and Plant Analysis (**ISSPA**)
- Publication on **scientific journals** (PT outcomes, transfer functions, etc.)



Geoderma 412 (2022) 115547

Contents lists available at ScienceDirect

**Geoderma**

journal homepage: [www.elsevier.com/locate/geoderma](http://www.elsevier.com/locate/geoderma)

**Transferability between soil organic matter measurement methods for database harmonization**

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Tyurin  
Walkley-Black  
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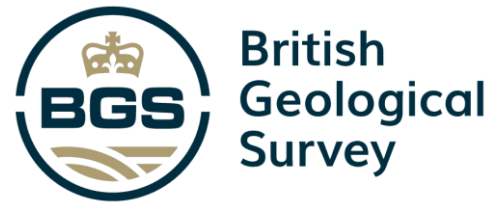
**ABSTRACT**

Soil organic matter (SOM) is one of the most important soil-forming factors and complex with a chemical composition not fully known. The amount of SOM traditionally is estimated by stoichiometric determination of carbon dioxide (CO<sub>2</sub>) released from oxidation reaction with a chromium mixture, hence the term *soil organic carbon* (SOC). The two most common oxidation methods are Tyurin (T) and Walkley-Black (WB). However, the efficiency of organic carbon oxidation depends upon the conditions of the oxidation reduction (redox) reaction (temperature, reagent concentration, oxidation time), which vary for both methods. The lack of consistent results from the oxidation methods has led to widely different conversion factors. Although the Tyurin's method has been slowly removed from some laboratories, there still remains a large number of samples, especially from Eurasia, that have been measured by this method for more than a century and continue at the present time. The objective of this research was to develop equations or pedotransfer functions (ptf) for converting SOC determined by the Tyurin method to current and more widely used methods, such as WB and dry combustion (DC).

# What's next?

- Review and translate GLOSOLAN SOPs and other documents
- More in-person workshops
- Regional and global PTs
- Procurement of laboratory equipment
- Development of scientific literature and reports
- Strengthening the activities of GLOSOLAN-Spec
- FAO global symposium on soil data quality – 2024
- World Soil Day 2024 theme: **soil measurement**

Thanks to the kind support of



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# GLOSOLAN

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