19th Working Session of the Intergovernmental Technical Panel on Soils (ITPS)

Progress on soil analysis and laboratories related activities (GLOSOLAN updates)

13-15 November 2023
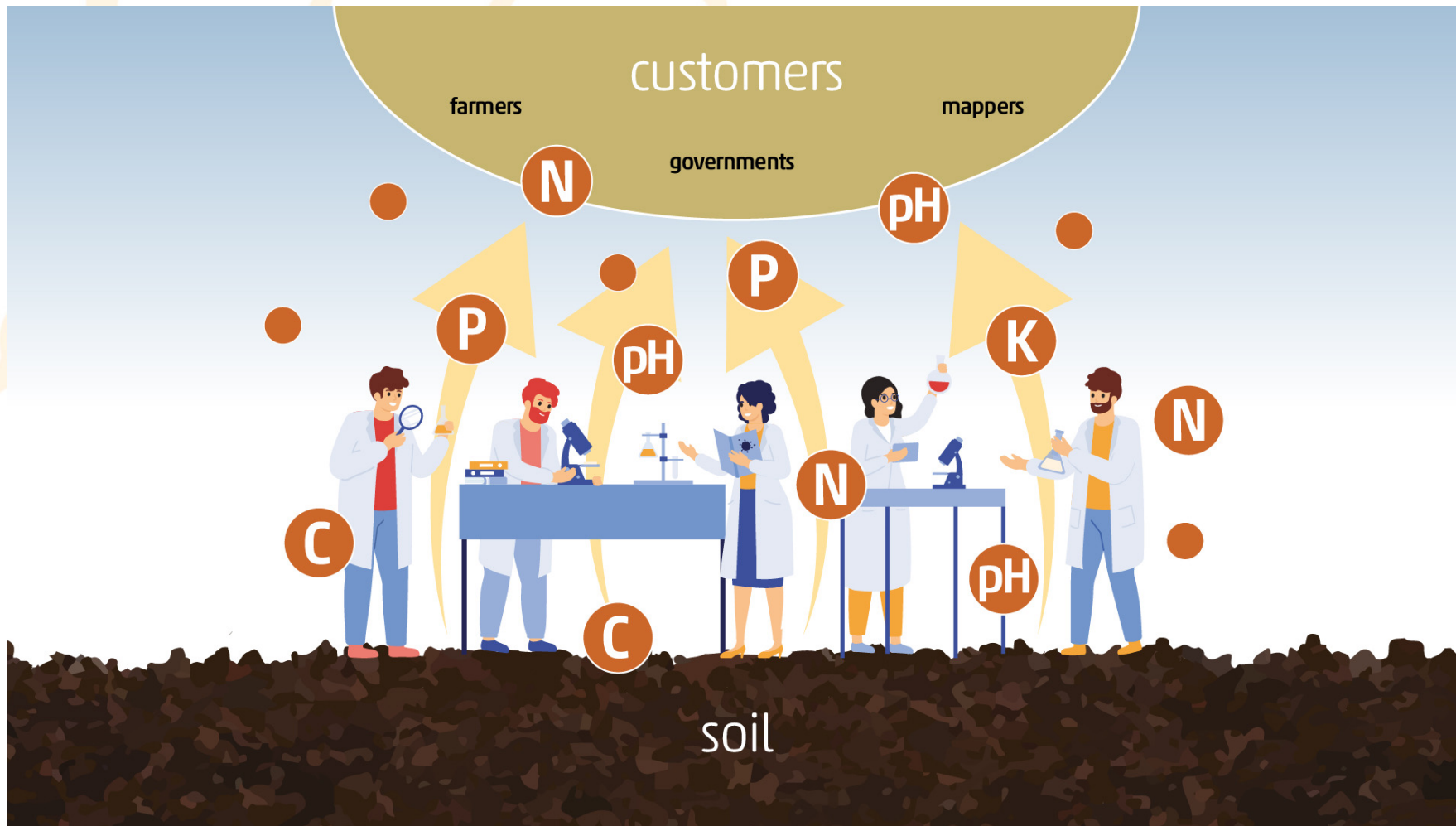Online meeting

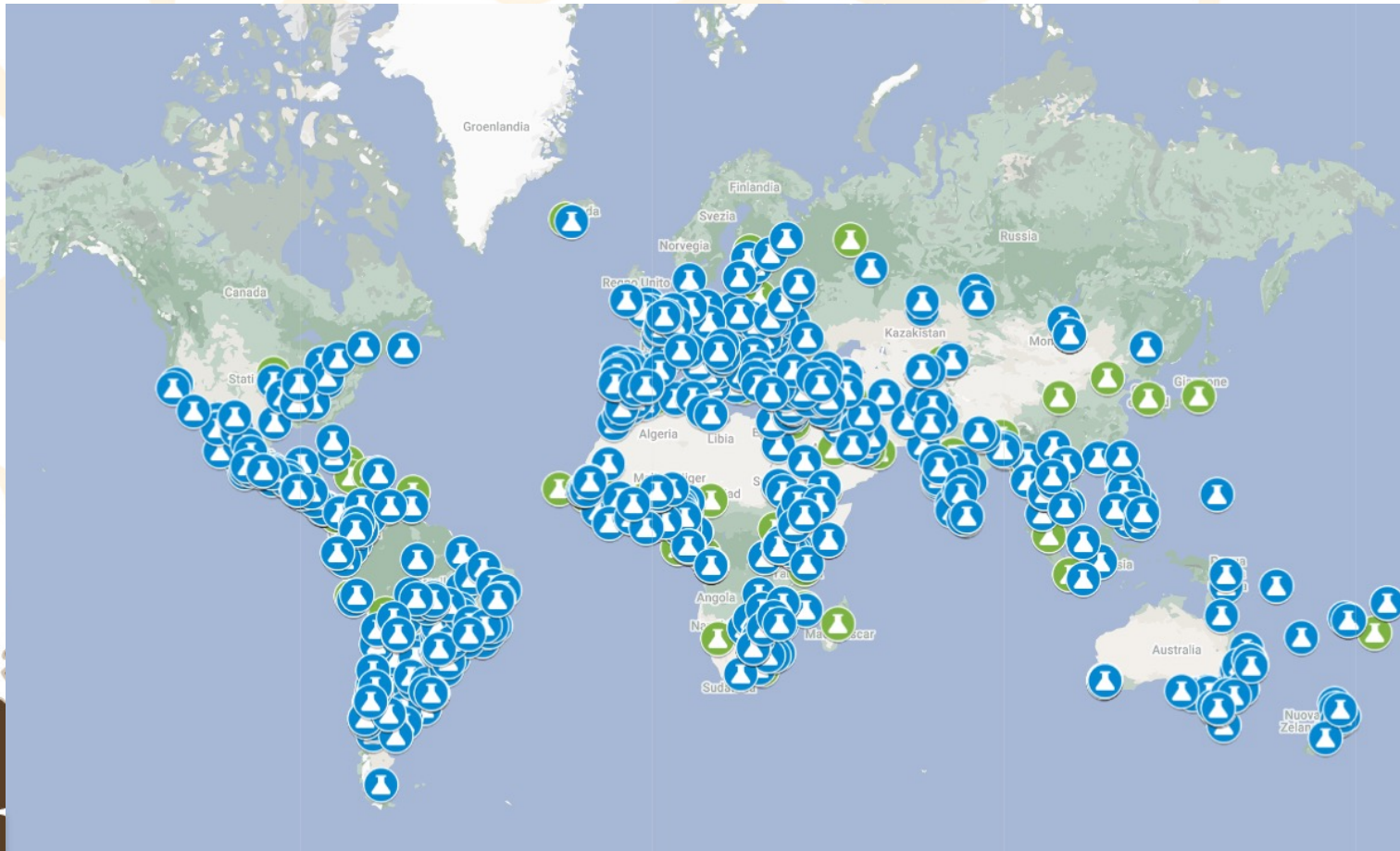*Filippo Benedetti, GSP Secretariat*

Nopmanee Suvannang, ITPS

Soil laboratories: where soil samples become data

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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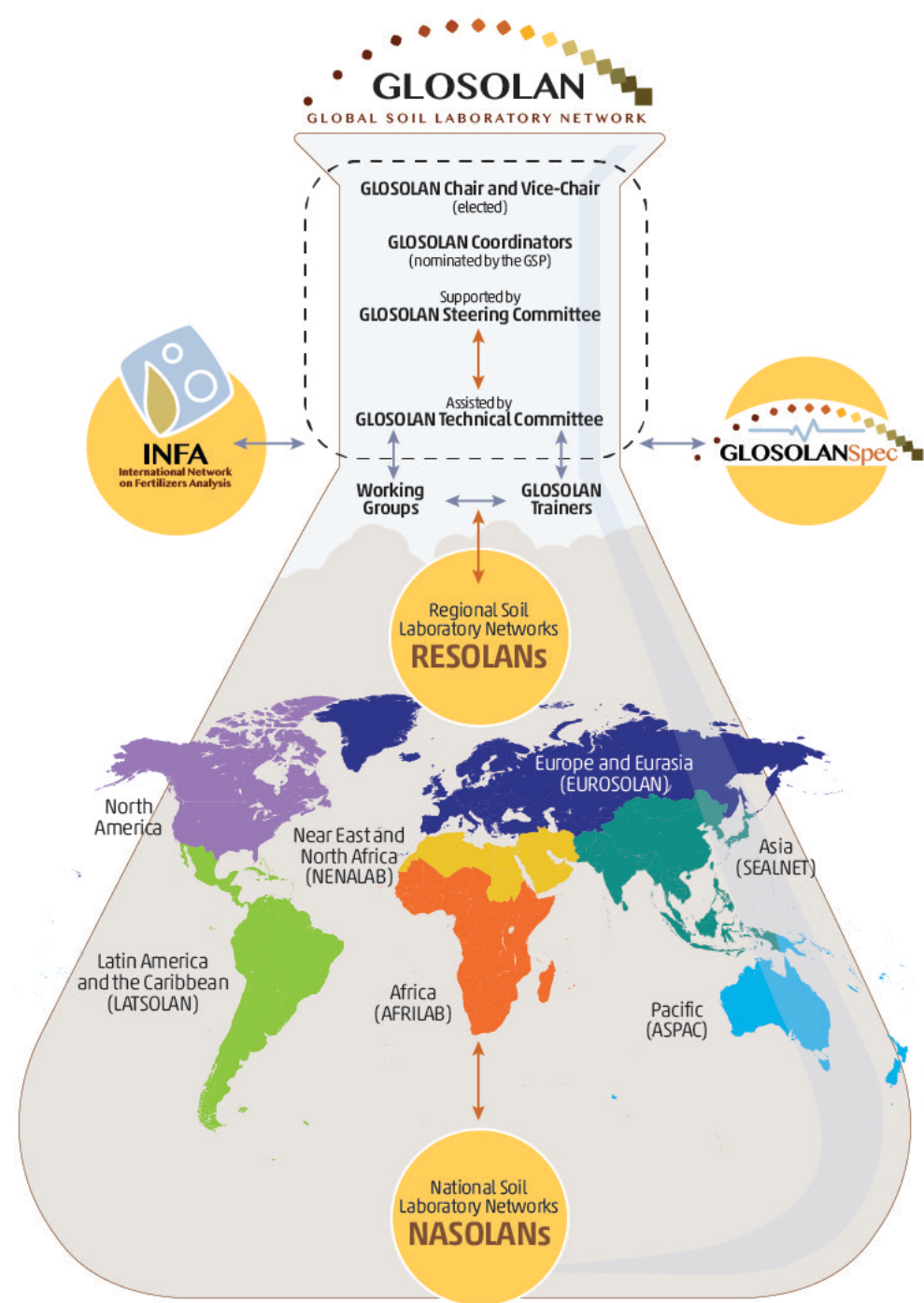
We operate at all levels...

GLOBAL

REGIONAL

NATIONAL

19th Working Session of the
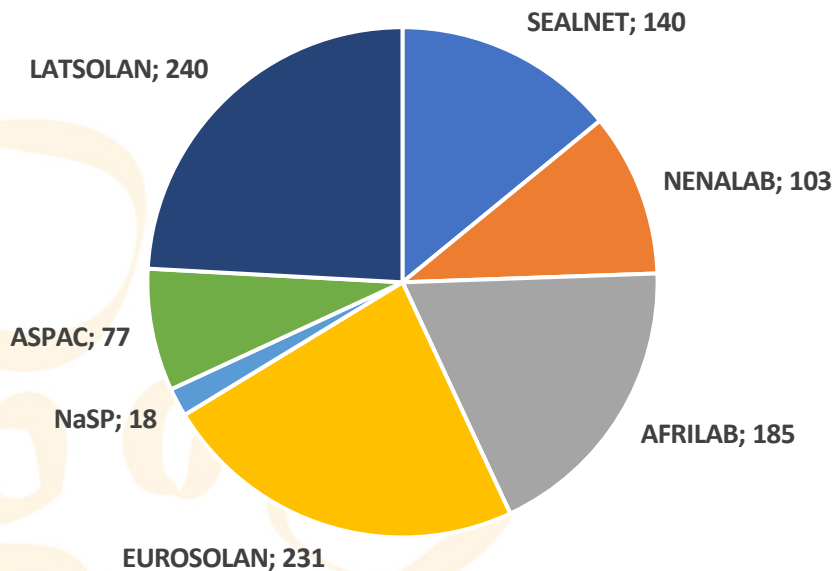
Collaborative and participative approach…

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

Status of GLOSOLAN

Currently 994 registered soil laboratories from 160 countries

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

SEALNET; 140

LATSOLAN; 240

NENALAB; 103

ASPAC; 77

AFRILAB; 185

NaSP; 18

EUROSOLAN; 231

GLOSOLAN growth

1000

750

500

250

0

January 2018   January 2019   January 2020   January 2021   January 2022   January 2023

Legend

Countries with laboratories registered in GLOSOLAN

Countries with no laboratories registered in GLOSOLAN yet
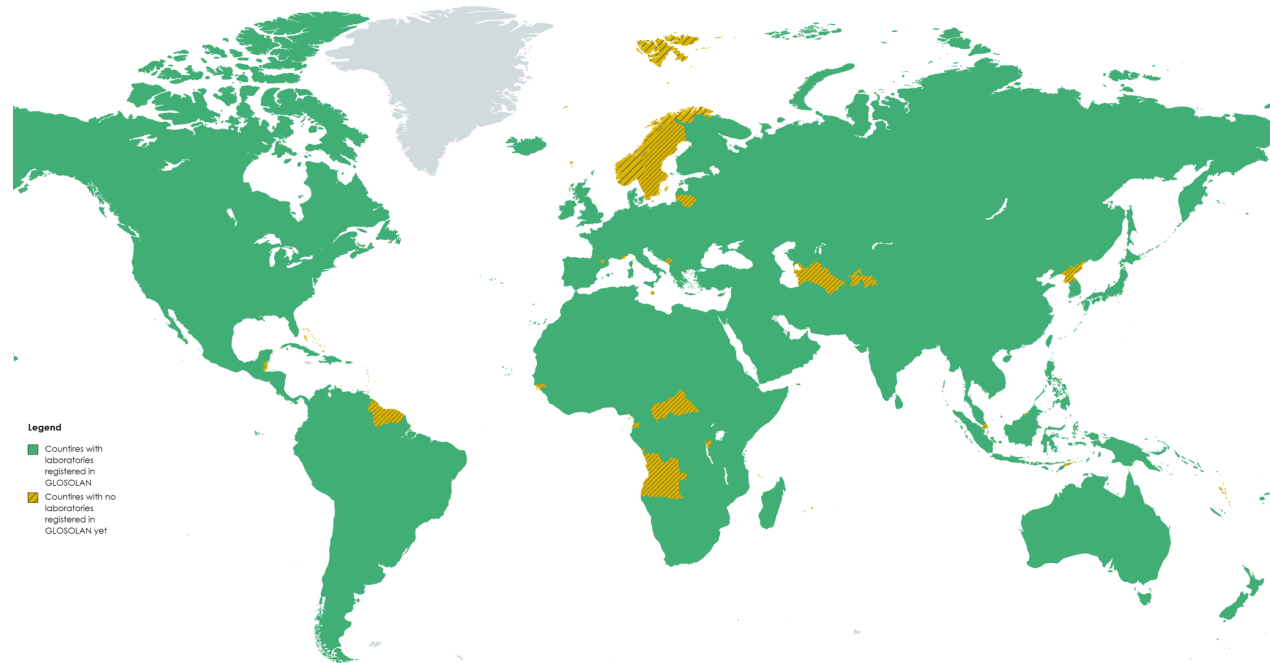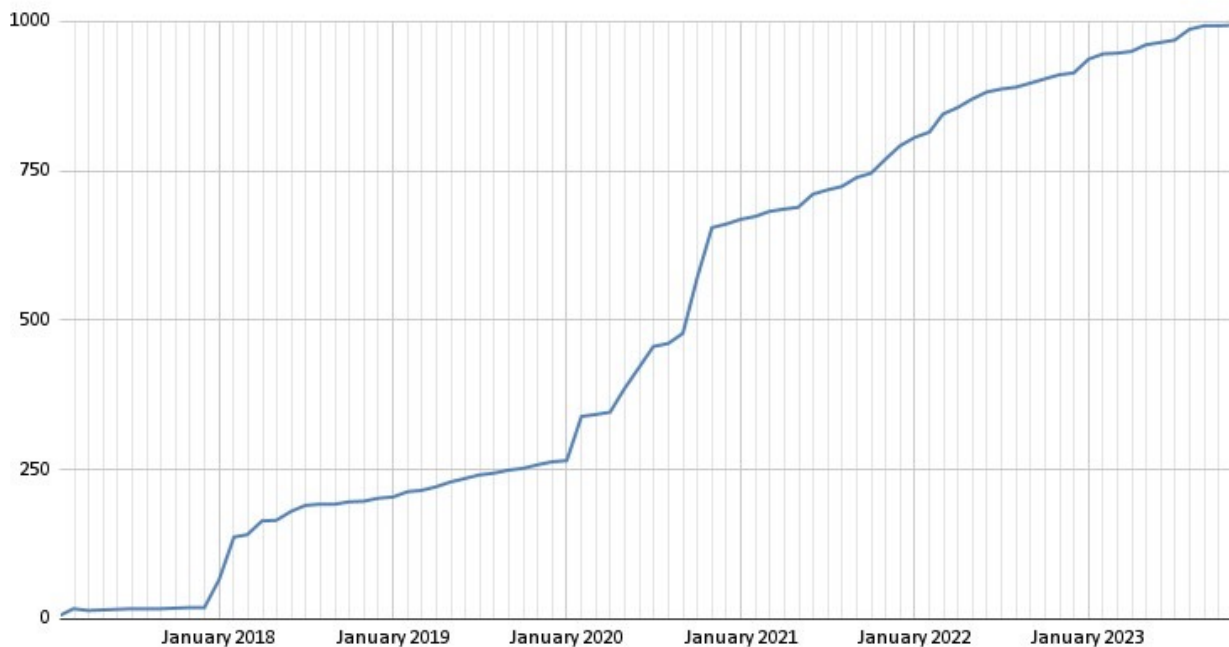
Harmonization of Standard Operating Procedures (SOPs)

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),
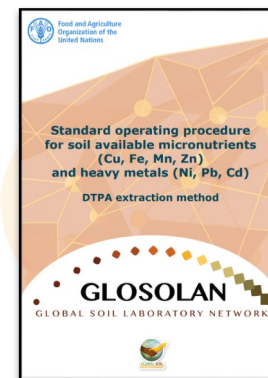- Contribute to the replicability of an analysis and to the quality and reliability of the data,
- Available online, for free and in several languages.

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

Standard operating procedure for soil available micronutrients (Cu, Fe, Mn, Zn) and heavy metals (Ni, Pb, Cd)
DTPA extraction method
GLOSOLAN
GLOBAL SOIL LABORATORY NETWORK

Standard operating procedure for soil respiration rate
GLOSOLAN
GLOBAL SOIL LABORATORY NETWORK

Under publication:
- Boron by hot water extraction

Under final review:
- Particulate organic carbon by physical fractionation
- Microbial biomass

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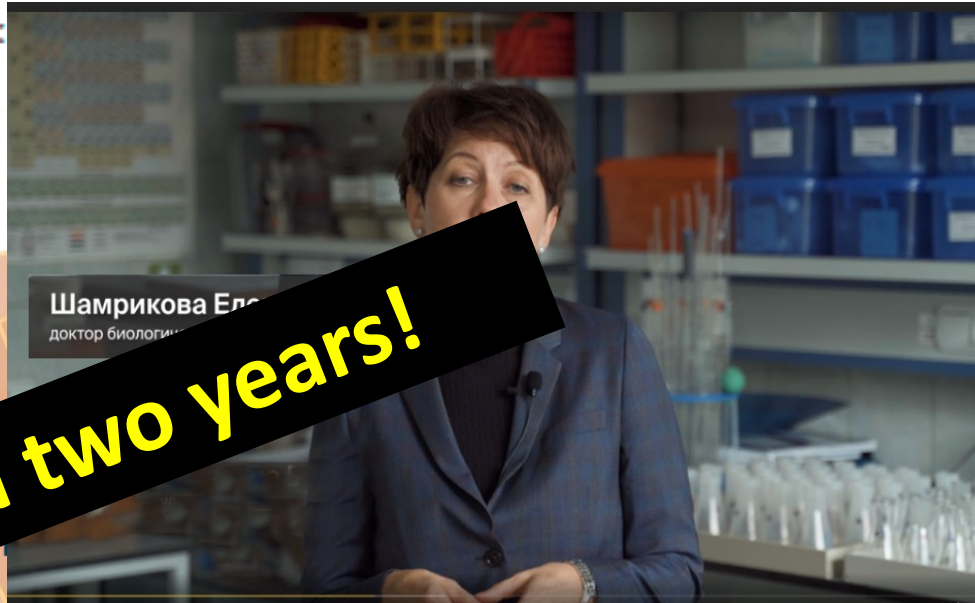
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GLOBAL SOIL PARTNERSHIP

Over 10 000 views in two years!

Capacity building

- In-person training sessions
  - Djibouti, December 2022
  - Uzbekistan, May 2023
  - Dakar, October 2023

- Webinars: new calendar in 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

Uzbekistan, May 2023

Djibouti, December 2022

Webinar on quality control, in Spanish, July 2022

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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 (Sengal) on 23-27 October 2023

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: over 250 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)

Soil Spec Net
INTERNATIONAL CAPACITY DEVELOPMENT GROUP ON SOIL SPECTROSCOPY

Soil spectroscopy
TRAINING MATERIAL
A primer on soil analysis using visible and near infrared (vis-NIR) and mid infrared (MIR) spectroscopy

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

#SDGs #Agenda2030 #GlobalGoals
The University of Sydney
0:07 / 21:28
EduSoils - Soil spectral data analysis (Level I) - Introduction #1

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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

Involvement in other GSP initiatives and programs

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

- SOILCARE

- SoilFER

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.)

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journal homepage: www.elsevier.com/locate/geoderma

Transferability between soil organic matter measurement methods for database harmonization

E.V. Shamrikova [a], B.M. Kondratenok [a], E.A. Tumanova [a], E.V. Vanchikova [a], E.M. Lapteva [a], T.V. Zonova [a], E.I. Lu-Lyan-Min [a], A.P. Davydova [a], Z. Libohova [b,*], N. Suvannang [c]

[a] Institute of Biology Komi SC UrD RAS, Kommunisticheskay 28, Syktyvkar, Russian Federation
[b] USDA-ARS Dale Bumpers Small Farms Research Center, 6883 S. Hwy 23, Booneville, AR 72927, United States
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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_2) 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).

Save the date: 7th GLOSOLAN meeting on 21-23 November

Thanks for your attention

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