

## **Miriam Ostinelli Global Soil Laboratory** Network (GLOSOLAN) and its initiative on soil spectroscopy (GLOSOLAN-Spec)

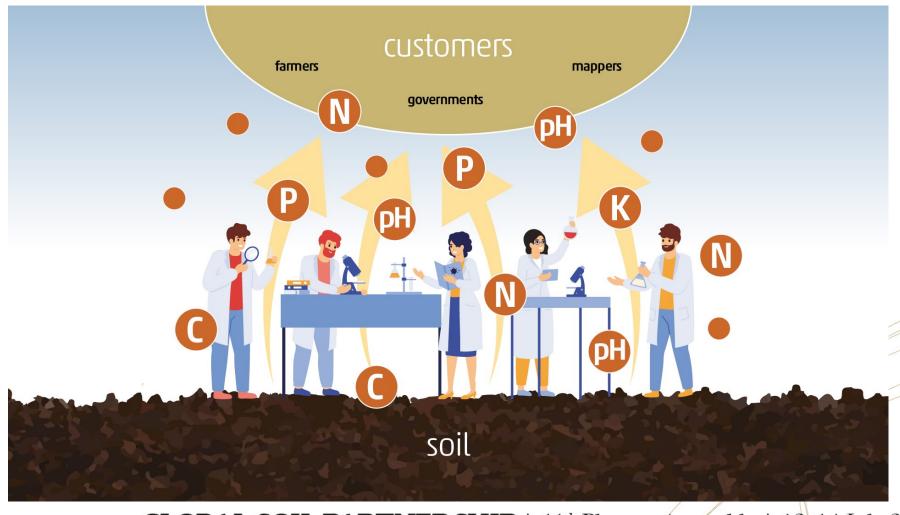
# GLOBAL SOIL PARTNERSHIP

11th Plenary Assembly

12-14 July 2023



### Soil laboratories: where soil samples become data



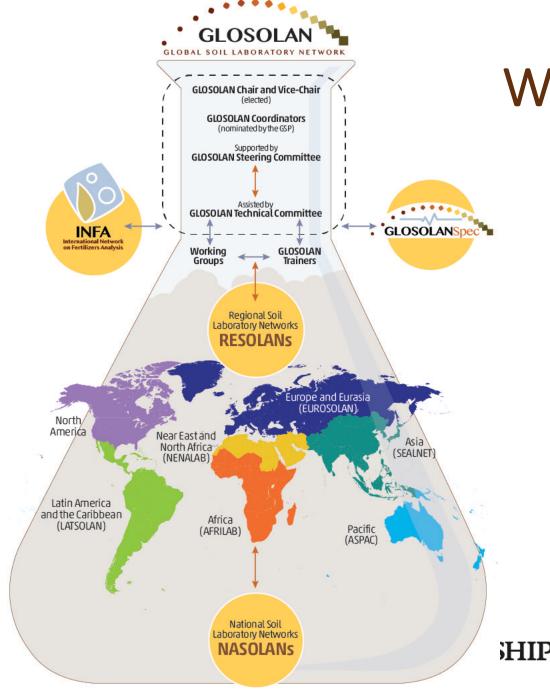


# GLOSOLAN: bringing soil laboratories to the forefront worldwide since 2017

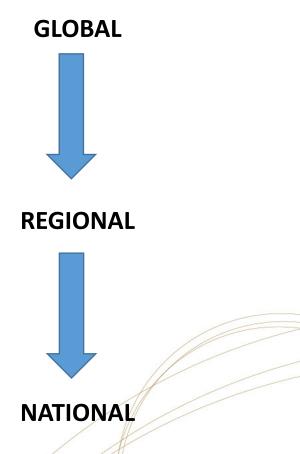


Currently grouping together around 1 000 soil testing institutions from over 155 countries





## We operate at all levels...







#### Collaborative and participative approach ...



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



#### What are we working on?

- 1) Harmonization of Standard Operating Procedures (SOPs)
- 2) Provision of trainings and prepare awareness raising material on different topics
- 3) Organization of inter-laboratory proficiency tests (PTs)
- 4) Collaboration with other networks (INFA, NETSOB, INSAS, INSOP, INBS)
- 5) Collection of soil import regulations worldwide (SIMPLE Database)
- 6) Share laboratory capacities and needs with the scientific communities, including details on data quality



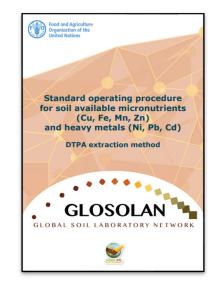
## Harmonization of Standard Operating Procedures (SOPs)

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

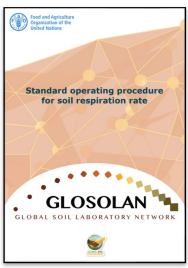
- Include step-by-step instructions, sections on health and safety, quality assurance and control (QA/QC),
- Contribute to the replicability of an analysis and to the quality and reliability of the data,
- Available online, for free and in several languages.



- 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





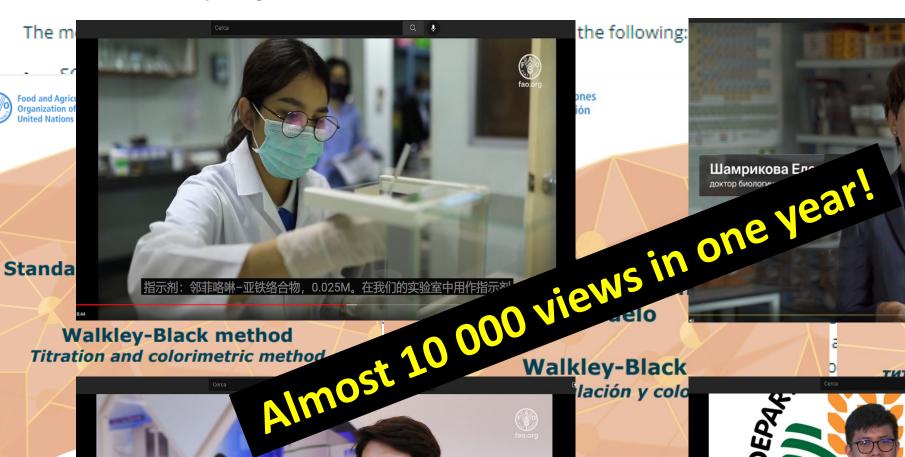


#### *Under final review:*

- Boron by hot water extraction
- Bulk density
- 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





the following:

Walkley-Black method Titration and colorimetric method









#### методом Уокли-Блэка титпованием и колопиметрическим

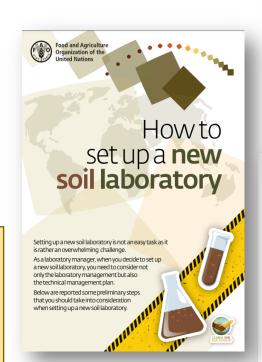


### Capacity building

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

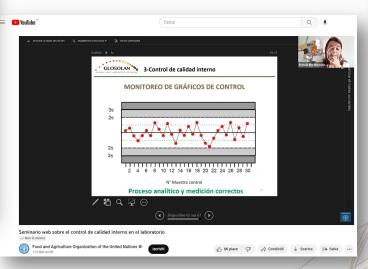
#### Several topics covered:

- 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



### GLOSOLAN global PT 2021-2022

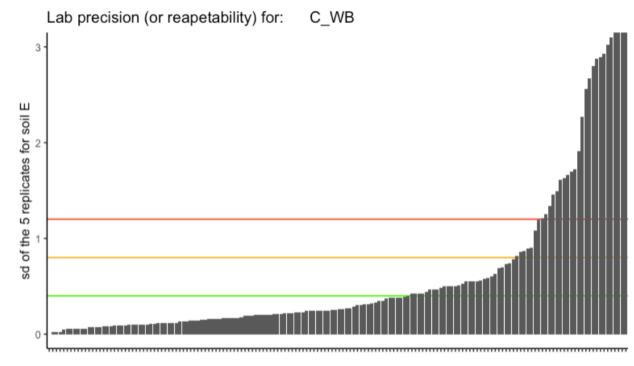
- 240 laboratories from around 110 countries
- Targeted parameters: C, N, P (using GLOSOLAN SOPs)
- Each lab received a set of 10 homogenized (sterilized) soil samples (6 soil types/5 blind replicates)
- Thanks to the support of BGS (UK) and IRD (France)





#### **Outcomes**

- Around half of the participating laboratories provided precise result. However, the remaining half of the labs showed to have some problems and a consistent number of labs have serious problems with analytical accuracy and precision
- GLOSOLAN needs to continue investing in harmonizing SOPs and assessing and monitoring laboratory performance through global, regional, and national PTs
  - → Build the capacity to organize PTs
  - → Launch of 3 regional PT in 2023
    - Eurasia (led by RUSOLAN, thanks to the support of PhosAgro)
    - Asia (led by the Philippines)
    - Africa+NENA (thanks to the support of BGS and IRD)
  - → Launch of several national PTs
- High-performing laboratories have a key role to play in helping and training less successful laboratories on a regular basis.



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



#### 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)











Artificial intelligence and machine learning in soil spectroscopic modelli



etails 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

etails 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-Lope: LANGUAGE: English



07 September 2022 | 16:00 CEST

SPEAKER: Dr Nuwan Wijewardane LANGUAGE: English



#### GLOSOLAN initiative on soil spectroscopy (GLOSOLAN-Spec) Next activities



- Soil spectral hub (GSP/FAO)
- Guides to available soil spectral resources
   (existing open-source soil spectral libraries and soil spectral estimation services)
- Publishing of Standard Operating Procedures for soil spectroscopy using NIR and MIR
- Expand capacity building- webinars, and technical document in additional languages.
   Additional guides in the style of the primer
- Continue webinar series with spotlight on state-of-art, research and discussion



#### Suggested actions for the GSP Focal Points

- Encourage national soil laboratories to join the network, implement the Standard Operating Procedures harmonized by GLOSOLAN, participate in proficiency tests (PTs)
- Invite resource partners to support GLOSOLAN activities and the National Soil Laboratory Networks (NASOLANs)
- Facilitate the implementation of the Resolution on the international exchange of soil samples for research purposes under GLOSOLAN, which was endorsed at the 27th Session of the FAO Committee on Agriculture (COAG), and promote the organization of national proficiency tests;
- Contribute with information on national legislations on the import/export of soil samples to further develop the Soil Import Legislation database (SIMPLE);
- Encourage national soil laboratories to participate on the Global Assessment of Soil **Laboratories 2023:**
- Invite countries to consider developing actively soil spectral laboratories, national soil spectral library and the estimation service, under the framework of GLOSOLAN Spec;
- Encourage institutions which already have developed soil spectral libraries and estimation services to make them open for research and decision-making purposes to other institutions.



APPENDIX F – Resolution on the international exchange of soil samples for research purposes  $A_{\rm poly} = A_{\rm poly} = A_{\rm poly}$ 

Recalling the importance of soil resources for the provision of ecosystem services essential for life on

Locate data automatic volunteration.

Highlighting that evidence-based decisions taken using harmonized and reliable data and information and automatic automatic and automatic and automatic and automatic and auto rangingung mat evidence-based decisions taken using harmonized and reliable data and information are critical to the achievement of sustainable soil management and food security and nutrition, a key objective of FAO's mandate, Streeting the need for coordinated actions to harmonize and standardize soil analytical data and soil

Accognizing the potential of the Global Soil Laboratory Network (GLOSOLAN) to go beyon cognuing the potential of the Gioral Soil Laboratory Network (GLUSULAN) to go beyond obstatory boundaries, with data generated by harmonized soil laboratories methods and procedures dual new youth units generators by mannouncers you have about any account of the set of (1) improve or establish national monitoring systems, (2) improve or establish es us (1) suprove or estabulist manufact momentum systems, (2) suprove or estabulistic formation Systems that can feed into the planned Global Soil Information System CGLOSIS), (3) report on the achievement of the Sustainable Development Goals and other ona programmes, (\*) support uscasson-maxing at ment and poucy reven, by consistence to the ment of international standards and indicators, (6) assess and monitor degraded lands and/or ment of the me ands affected by climate change and other threats, as identified in the Status of the World Soil Resources report. (?) interpret soil resources for best use and management. (8) interpret soil resources for best use and management. (/) merpret sou resources nor oest use one management (musty, physics and biology, (9) contribute to and improve soil class outween sou chemistry, paysies and oscopy, (2) commons to ano amprove sou cassamons on and description, (10) assist companies manufacturing laboratory equipment to improve their products, (11) sexuations (10) assets transposes intermediately intermediately equipment to improve time products expand opportunities for technical and scientific cooperation, (12) strengthen the capability of coverage (13) identify reasonable works and (14) intermediate intermediate to assessing the contract of the capability of the contract of the capability of th J opportunities not recuirion and scientific cooperation, her strengment use capacities services, (13) identify research needs, and (14) increase investments in research.

Achiousledging the significant and growing participation of laboratories in GLOSOLAN, the many achievements of the network since its establishment in November 2017, and its well-defined and

Recalling the difficulties encountered by GLOSOLAN in the exchange of soil samples for the execution of inter-laboratory comparisons in Latin America and Asia. faving considered that GLOSOLAN provides laboratories participating in inter-labo

awing considered that ULUOULAIN provides laboratories participating in inter-laboratory comparisons with phytosanitary safe soil samples and detailed guidelines on how to handle the soil amples, minimizing the risk of any type of contamination. Taker note of the need for GLOSOLAN to have a simplified procedure for the international exchange

or soul samples for research purposes,

Welcomer the proposal of the GSP Secretariat and laboratories in GLOSOLAN to submit the request

and a substitution of the GSP Secretariat and laboratories as the 27th secretariat and the Committee of Welcome: the proposal of the USF Secretariat and laboratories in GLUSULAN to submit the re-for the establishment of such a procedure to FAO Members at the 27th session of the Committ

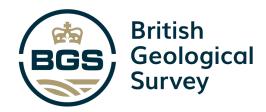
7th GSP Plenary Assembly 05 June 2019 GSPPA: VII/2019/4 21



## Thanks to the kind support of

























## **GLOBAL SOIL PARTNERSHIP**

11th Plenary Assembly

12-14 July 2023

Thank you very much for your attention!

