

Terms of Reference

GLOSOLAN's Technical Working Group on Soil Spectroscopy

Background

Spectroscopy is the study of the interaction between matter and electromagnetic radiation. It is based on the principle that molecular vibrations and electronic transitions associated with soil constituents absorb light while interacting with radiation. Soil spectroscopy is a method that has the potential of more rapidly and cost-effectively measuring soil properties in the lab and in the field. Soil spectral analysis estimates soil properties by calibrating conventional reference measurements, like wet chemistry soil tests, to the spectral signatures. The potential of spectral technology in soil mapping and monitoring is tremendous as it is fast, cost-effective, environmentally friendly, nondestructive, reproducible and repeatable. Numerous soil properties can be directly calibrated to near- and mid-infrared spectra (MIR) due to the fact that spectral signatures respond to soil mineral and organic composition.

In April 2020, GLOSOLAN officially launched its initiative on soil spectroscopy that was consolidated through the organization of the first plenary meeting on soil spectroscopy on 23-25 September 2020. For the first time since the discovery of this technology, institutions and experts from around the world are now joining efforts to use this technology to support decision making on soil protection globally.

Composition and governance

The technical working group will act under the umbrella of the Global Soil Laboratory Network (GLOSOLAN) and under the direction of the GLOSOLAN Chair and vice-Chair. The GLOSOLAN Coordinator will provide support as a facilitator.

The technical working group is led by one or more leader(s) working in coordination with the GLOSOLAN Chair, GLOSOLAN vice-Chair, and GLOSOLAN Coordinator at the Global Soil Partnership. The term for the leader(s) is two years after election. The appointment of the working group leader(s) and the extension of their mandate to a second term will take place during the annual plenary meeting on spectroscopy.

The working group leader(s) are responsible for:

- i. Supporting and ensuring the timely implementation of the GLOSOLAN work plan on spectroscopy;
- ii. Reporting on spectroscopy activities at the annual GLOSOLAN meeting;
- iii. Representing the working group on spectroscopy at any other GSP meetings or international events;
- iv. Supporting the GLOSOLAN Coordinator in capacity-building and financial-resources-mobilization activities;
- v. Ensuring that the activities of the working group are implemented according to the principles of GLOSOLAN, including transparency, inclusivity, and respect; and
- vi. Coordinating cooperation with projects and initiatives that contribute to the aims of the working group, including research, service, and capacity development.

All members of the working group are to be experts on the topic of soil spectroscopy. Representatives from the Regional Champion Laboratories/Institutes on soil spectroscopy must also be part of the working group.

At least one member of the Intergovernmental Technical Panel on Soils (ITPS) should be part of the working group on soil spectroscopy. In this regard, the identified expert(s) should assist the GLOSOLAN Coordinator in reporting on GLOSOLAN activities to the ITPS. Because GLOSOLAN works on harmonization and GLOSOLAN documents are released after long discussions among laboratories, countries, and implementing partners, documents produced under GLOSOLAN do not require the approval of the ITPS before publication. The opinion and clearance of the ITPS and that of the GSP Plenary Assembly are required only for documents that have political implications, such as the “Resolution for the International Exchange of Soil Samples for Research Purposes under GLOSOLAN” (presented and approved at the Seventh GSP Plenary Assembly in 2019), and for the launch of new initiatives, such as the initiative on soil spectroscopy (presented and approved at the Seventh GSP Plenary Assembly in 2019) and the initiative on soil fertilizer analysis (presented and approved at the Eighth GSP Plenary Assembly in 2020).

The group will be organized in sub-groups based on the GLOSOLAN work plan for soil spectroscopy. In accordance to the decision-making process endorsed for this initiative by GLOSOLAN members and partners on soil spectroscopy, the working group should work in close contact with countries and laboratories (see the [report](#) of the First Plenary Meeting on Soil Spectroscopy). Countries and laboratories will provide the working group with data and information to develop standards, tools, and other soil spectroscopy materials and will review draft documents and prototype tools developed by the working group.

The number of members in the working group is not limited. The GLOSOLAN Coordinator and the working group leader(s) should ensure to the best of their ability that the working group has an appropriate geographical balance and representation of members. All GLOSOLAN members receive regular updates on the work of the network on spectroscopy; it is not necessary to register in the working group to be informed of its activities.

New members of the technical working group

Experts interested in joining the working group can send an expression of interest to the GLOSOLAN Coordinator any time. Each will join the working group after providing a short summary of their experience and interest in the GLOSOLAN work on soil spectroscopy. The summary is intended to ensure that member's skills are used to best effect and that member's interests in contributing to GLOSOLAN are met. The GLOSOLAN Coordinator and the working group leader(s) will consider the applicant's:

- Reputation as an expert on spectroscopy;
- CV and publication list;
- Participation in projects that could help to implement the GLOSOLAN work plan on soil spectroscopy; and
- Time available to commit to GLOSOLAN.

The technical working group on spectroscopy will:

- i. Contribute to the preparation (writing, revision, and finalization) of spectroscopy materials, such as protocols, guidelines, manuals, and training material and videos;
- ii. Advise laboratories working on or interested in working on spectroscopy as needed and support capacity building activities;
- iii. Coordinate the establishment of the global spectral calibration library and the development of tools for the calibration service;
- iv. Coordinate joint writing of publications;
- v. Support the organization of the annual plenary meetings on spectroscopy;
- vi. Contribute to the development of the annual GLOSOLAN work plan on spectroscopy;
- vii. Promote GLOSOLAN at the global, regional, and national level, motivating other laboratories to join the network; and
- viii. Contribute to the mobilization of financial resources under GLOSOLAN.

Work plan and functioning

Every year, the GLOSOLAN work plan on soil spectroscopy is discussed at the plenary meeting on soil spectroscopy, which is attended by all GLOSOLAN members and partners on soil spectroscopy. The work plan lists all the activities on soil spectroscopy to be implemented by GLOSOLAN for one year, assigns tasks to partners, and specifies deadlines. The activities in the work plan are based on the concept notes: "[A Global Soil Spectral Calibration Library and Estimation Service](#)" and "[Global Capacity Development in Soil Spectroscopy](#)." The work plan is presented at the annual GLOSOLAN meeting for final endorsement.

To ensure the active and constructive participation of all experts, the GLOSOLAN Coordinator will monitor the activities of the working group and its members. Inactive members will be contacted by the GLOSOLAN coordinator and eventually removed from the working group. The working group is based on the willingness of its members to jointly achieve a common goal. In this regard, all members commit to a positive and constructive approach that facilitates the work.

Regional Champion Laboratories and/or Institutes

To promote the implementation of GLOSOLAN activities on soil spectroscopy at the national and regional level and to break language and cultural barriers, regional champion laboratories and/or institutes are identified and re-confirmed at the annual plenary meetings on spectroscopy. Ideally, at least one regional champion laboratory/institute should be identified per region: Sub-Saharan Africa, Middle East and North Africa, Europe, Eurasia, Asia, North America, South America and the Caribbean, and the Pacific. If this is not possible, a champion laboratory/institute can volunteer to serve more than one region. In such case, the following criteria should be considered:

- Regional proximity,
- Cultural and language similarities, and
- Expertise on different aspects of soil spectroscopy.

Each region is free to identify either one or two laboratories or institutes to serve as regional champions. Each region can identify sub-regional champions to better assist countries in the area. The sub-regional champions should coordinate actions and be calibrated against the primary regional champions.

By accepting to serve as regional champion laboratory and/or institute, a laboratory and/or institute agrees to:

- i. Provide all the information needed by GLOSOLAN to harmonize procedures and ensure the comparability of data. The required information includes, but is not limited to, methods, instruments, and soil sample preparation protocols and methods used for wet chemistry and soil spectroscopy analysis;
- ii. Participate in the inter-laboratory comparisons organized by GLOSOLAN and take all actions needed to ensure the comparability of results with other regional champion laboratories and institutes;
- iii. Welcome and facilitate the work of the Panel in charge of approving the quality for the soil spectral data produced at their facilities that will be added to the global spectral calibration library;
- iv. Fill soil data gaps in the Kellogg Soil Survey Laboratory library so that representability and quality go together;
- v. Analyze the samples they receive from laboratories in their region while helping these laboratories to build their own libraries using GLOSOLAN's quality standards;
- vi. Support laboratories that are already using spectroscopy technology to implement GLOSOLAN standards and improve their performance in soil analysis. Such support might include the exchange of information and experience, the provision of remote or in-person trouble shooting, and guidance on the operation of equipment;
- vii. Guide laboratories that would like to start a spectral library in identifying and purchasing the right equipment, in training their staff, and in developing a well-functioning laboratory;
- viii. Assist GLOSOLAN in coordinating and implementing capacity-building programs in the region; and
- ix. Support GLOSOLAN with downscaling activities on spectroscopy, such as the development and use of calibration models and the shipment and analysis of soil samples. This support might include the organization of regional meetings, webinars, and exchange programs.

There is no time limit or term to the position of regional champion laboratories and/or institutes. Regional champion laboratories and/or institutes keep their role as long as they comply with the Terms of Reference in this document. In case of need, a position will be revised at the first available plenary meeting on spectroscopy.