

GLOSOLAN Spectroscopy-II/21/Report



Food and Agriculture  
Organization of the  
United Nations



# Report of the Second Plenary Meeting on Soil Spectroscopy of the Global Soil Laboratory Network (GLOSOLAN)

Zoom, 2-4 November 2021

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Food and Agriculture Organization of the United Nations

Rome, 2021

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## 1. Introduction

The second plenary meeting of the Global Soil Laboratory Network Initiative on Soil Spectroscopy (GLOSOLAN-Spec) was virtually organized by the Global Soil Partnership (GSP) on 2-4 November 2021 on the online platform Zoom (See agenda in Annex I). The meeting was attended by approximately 250 participants from 81 countries (see list of participants in Annex II) and was opened by Mr. Ronald Vargas, GSP Secretary, and Ms. Nopmanee Suvannang, GLOSOLAN Chair. Mr. Vargas announced that given the importance of soil spectroscopy Dr. Yi Peng, an expert whose mission is ensuring that key players on soil spectroscopy partake in the initiative and that is implemented using a country driven approach, was recruited. It was also agreed that although the establishment of a global soil spectral library is important, building the capacity of laboratories in soil spectral analysis is even more crucial. Mr. Vargas concluded by remarking the importance of establishing a more inclusive process to implement the work plan of the GLOSOLAN-Spec, and reiterating to participants the importance of revising the initiative's objectives, mission, work plan and governance during the meeting.

## 2. Report on the Work Performed by the Initiative in 2020-2021

Mr. Richard Ferguson from the Kellogg Soil Survey Laboratory (United States) and Dr. Yi Peng presented the main achievements of the GLOSOLAN-Spec Initiative in 2020 – 2021. These include:

- An agreement on the role of the Intergovernmental Technical Panel on Soils (ITPS) in GLOSOLAN-Spec was reached;
- After consulting the GLOSOLAN members, the GSP Secretariat confirmed that there is no need to amend the GSP Soil Data Policy for implementing the work of GLOSOLAN-Spec;
- Three working groups were established (General working group, Library working group, Estimation Service working group) and their first meeting was organized in December 2020;
- A global soil spectroscopy assessment was conducted and published on the GLOSOLAN website;
- Eleven regional champion laboratories on soil spectroscopy were identified by the Regional Soil Laboratory Networks;

- Six online webinars on the topic of soil spectroscopy were organized and attended live by a total of 2607 participants from 142 countries. All video recordings are online available on the GLOSOLAN website;
- Some training material for beginner level was developed in collaboration with a World Bank's project in Uzbekistan. This will be published as a World Bank-FAO joint publication in early 2022;
- Arrangements on the preparation of a video course (six sessions) on the topic of soil spectral modelling were made in collaboration with the University of Sydney. The course will be published on the GLOSOLAN website in 2022.

Dr. Peng presented and led the discussion on the main challenges faced by the initiative in 2020 – 2021:

- Shipment of soil samples to United States Department of Agriculture's Kellogg Soil Survey Laboratory (KSSL): very few countries expressed the interest to send soil samples to the USA because they prefer to develop their own capacities and build their own national soil spectral library and estimation service. Additionally, very few countries could provide the amount of soil requested by the KSSL (500g per sample).
- Two SOPs for MIR measurement were prepared but not published, due to mentioning of the instrument brand name. In this regard, the FAO legal office did not authorize publication.
- The discussion on a potential collaboration between GLOSOLAN and IEEE was closed because IEEE could not make its publication open source.

### 3. Identification of Areas for Improvement

#### 3.1 Review of the GLOSOLAN-Spec Objectives

During the first plenary meeting on soil spectroscopy (September 2020), GLOSOLAN members agreed on the 2020-2021 work plan and objectives of the GLOSOLAN-Spec Initiative. However, during the implementation phase, the soil spectroscopy community expressed the following concerns to the GLOSOLAN Coordinators:

- The GLOSOLAN-Spec should adopt a broader definition of soil spectroscopy;
- National capacity development is not sufficiently included in the work plan of GLOSOLAN-Spec.

Because of this, GLOSOLAN found appropriate to propose to its members a review of the objectives of the GLOSOLAN-Spec initiative and the work plan on the establishment of global spectral estimation services (see the decision document in Annex III). During the meeting, the revised objectives of the GLOSOLAN-Spec were discussed and endorsed. Ultimately, the GLOSOLAN-Spec Initiative aims to:

- Support the development of all types of soil spectroscopy at national, regional, and global levels. To achieve this objective, this initiative will be supervised by a group of experienced scientists to ensure that all activities are science based;
- Support countries in establishing their own soil spectral laboratories and national soil spectral libraries with standardized methods and decentralized estimation services. To achieve this objective, GLOSOLAN will be using a country-driven approach and will invest in capacity building activities at the national or regional level;
- Continuously support the development of the global spectral estimation services by encouraging countries to share part of their existing national soil spectral libraries on a voluntary basis;
- Support the development of standards and protocols for soil spectroscopy, including but not limited to soil sample preparation, measurement protocols, quality assurance, and data analysis and modelling.

Many key players in the soil spectroscopy community took the floor to express their strong support of the GLOSOLAN-Spec initiative in its new setup/arrangement. Stakeholders from different institutes also expressed their appreciation to GLOSOLAN for being inclusive, connecting the soil spectroscopy community, and promoting activities using a country-driven approach. In this regard, Mr. Peng encouraged countries to actively collaborate with advanced institutes, for the development of soil spectroscopy at the national level. All key players from advanced institutes confirmed their willingness and capacity to support countries through different approaches with

GLOSOLAN acting as facilitator. GLOSOLAN was tasked to gather all institutes specialized in soil spectroscopy and make their information available on the GLOSOLAN website in the form of a database. This information can facilitate countries with the ability to find suitable collaborators depending on their needs.

### 3.2 Review of the GLOSOLAN-Spec Governance

During the first plenary meeting on soil spectroscopy (September 2020) GLOSOLAN members agreed on the GLOSOLAN-Spec being represented by one or more working group leader/s; that counted on the support of a working group, organized in sub-groups based on the GLOSOLAN-Spec work plan. In this regard, in 2020-2021, three sub-groups were established.

However, GLOSOLAN noticed that the agreed governance did not cover all soil spectroscopy related activities, no follow-up actions were taken after the working group meetings, and activities tended to be centralized within the working group leaders on few specific objectives. In order to prevent experts from losing interest in the initiative, the GLOSOLAN coordinators proposed to review its governance. Therefore, the proposal to identify one GLOSOLAN-Spec Chair, establish a Steering Committee and have only one working group was presented to participants of the second plenary meeting (The Terms of Reference (TORs) for these positions are reported in Annex IV). Please note that no change was proposed to the TORs for the position of Regional Champion Laboratories and/or institutes on soil spectroscopy.

After discussions, GLOSOLAN members agreed on the proposed governance and TORs. Dr. Eyal Ben Dor from the Tel Aviv University (TAU), Israel was elected GLOSOLAN-Spec Chair after advancing in the elections against Ms. Fenny van Egmond, from the Wageningen University, the Netherlands. Dr. Ben Dor is a full professor at the Tel Aviv University (TAU), currently serving as the head of the remote sensing laboratory (RSL) within this department. He has more than twenty-seven years experience in remote sensing of the Earth, with special emphasis on the Hyperspectral Remote Sensing technology (HRS) and soil spectroscopy. Having developed many applications using the HSR technology for civil engineering, medicine, veterinary science, environmental science, water management, vegetation monitoring, atmosphere assessment and soil monitoring,

his studies focus on both quantitative and qualitative analysis of field and laboratory reflectance and emittance data across the VNIR-SWIR-LWIR spectral regions and on processing of airborne and orbital hyper spectroscopic data for precise and unique surface and atmosphere characterization. With his strong background in soil science, spectroscopy and remote sensing, he is author of more than 200 papers, book chapters, patents and technical reports. Dr. Ben Dor is founder of the soil spectroscopy discipline, that began 30 years ago and is now implementing it into precision agriculture, food and homeland securities and Agritech. Furthermore, he is an advisor for the SHALOM ASI-ISA mission to space and is a member of the advisory board of the Sentinel-10 mission on behalf of the European Space Agency (ESA, CHAIM mission). Finally, he is also a member of the science team of EMIT- NASA mission to mount a hyperspectral sensor onboard the International Space Station in 2022.

Prof. Eyal Ben Dor and Mr. Peng will work on the establishment of the Steering Committee, right upon closing the meeting; Members of the Steering Committee will be selected based on the criteria in the TORs, a survey to identify new members of the working group and to enquire whether current members of the working group are still interested in the position will be launched by the GLOSOLAN coordinators right after the meeting.

#### 4. Global Spectral Estimation Service

The second day of plenary meetings mainly focused on the discussion of how to establish a global soil spectral library and provide free global Spectral Estimation Services. Mr. Raphael Viscarra Rossel from Curtin University, Australia, presented an overview of the research and development of soil spectroscopy during the last twenty years. He also presented a few examples of how soil spectral information can facilitate digital soil mapping at different scales in Australia, and summarized the advantages and disadvantages of soil spectroscopy for soil analysis. Finally, he gave a demonstration of a newly developed software platform for soil organic carbon estimation services, "globeSpec". The platform was developed by Mr. Viscarra Rossel and his team after he started his new position in Curtin University, who proposed that FAO host this platform, to provide a global free spectral estimation service under the GLOSOLAN-Spec Initiative.

In order to establish a global Soil Spectral Library and a global Spectral Estimation Service, Dr. Peng proposed to support countries in establishing their own soil spectral laboratories and national soil spectral libraries with an estimation service. Once national soil spectral libraries are established, GLOSOLAN will connect them for the purpose of establishing global spectral free estimation services for the different spectral techniques. The contribution to the development of such global spectral free estimation services will be voluntary as per points below:

- With the support of its partners, GLOSOLAN will start to establish a global spectral estimation service, based on current available open data resources and existing estimation platforms.
- A country can decide whether they are willing to join the development of global spectral estimation services or not, if not, GLOSOLAN will continue to support countries for further development of their capacities as described above. Countries can also decide to join the development of global spectral estimation service at any time and without a particular contribution.
- A country can decide how much data to share for the establishment of global spectral estimation service.
- A country can decide whether the shared data will be an open resource or only used for the global estimation service. The condition of using such datasets for research and other purposes should be discussed and documented.
- The shared soil spectral library from countries will be hosted by GLOSOLAN, for providing estimation service purposes only. GLOSOLAN only hosts such datasets under the framework of the GSP data policy, and the country should have a full data license.

The discussion was further enriched by Dr. Eyal Ben Dor's presentation on a Mediterranean soil spectral library, as an example for data harmonization and countries collaborations. Ms. Johanna Wetterlind, from the Swedish University Of Agricultural Sciences, Sweden, presentation on new soil spectroscopy projects within a European Joint Programme on Agricultural Soils (EJP SOIL), and that of Ms. Leigh Ann Winowiecki from ICRAF, Kenya, on how ICRAF combined systematic field assessments with soil spectroscopy to build a geo-referenced global spectral library across the

tropics. The three presentations represent good examples of large soil spectral libraries with different applications at regional scales. Speakers also stressed that regional and national soil spectral libraries can potentially contribute to the establishment of a global soil spectral library, providing free global estimation services under the GLOSOLAN-Spec initiative. During the discussion, some stakeholders expressed their strong interest to contribute to the establishment of a GLOSOLAN-Spec global soil spectral library and estimation service, with their own data under the proposed framework. As a result, GLOSOLAN-Spec was asked to draft guidelines for the establishment of the global soil spectral library and estimation service, which should include a note on the use of soil spectral libraries for research purposes.

## 5. Global Proficiency Testing (PT) on Soil Spectroscopy

Dr. Peng reiterated that a global Proficiency Test (PT) on soil spectroscopy has never been organized before, in this regard, the GLOSOLAN-Spec should first define the objectives of this exercise. After discussion, the plenary agreed to organize a global PT to include both Vis-NIR and MIR spectra. In order to move forward with its arrangements, a small group of experts will be asked to develop the road map and the technical guidelines for the execution of the GLOSOLAN-Spec PT.

Additionally, GLOSOLAN needs to find available soil samples for PT, because soil spectroscopy measurement generally require more quantity of soil samples than wet chemistry analysis. However, samples can be reused after spectral measurement.

## 6. Webinars and Trainings

GLOSOLAN-Spec successfully organized six webinars in English in 2021. Building on this success, more webinars in different languages will be organized in 2022. GLOSOLAN already confirmed with few experts to give 4-6 webinars in 2022, during the meeting, and a few more experts expressed their interests to give webinars on a wide variety of topics. During the discussion countries also asked to receive in-person training, accordingly GLOSOLAN-Spec will try to accommodate this request if and when the COVID pandemic and the budget availability allow.

In conclusion, Dr. Peng and other experts expressed their concerns related to the GLOSOLAN-Spec training and capacity development programme; because soil spectroscopy is a very complex science, countries should have good understanding on this technology (from sample preparation to spectral modelling) before starting their own application, such as a national estimation service. Otherwise, soil spectroscopy can be misused by some unexperienced labs, especially commercial labs and consequently this technology will not be recognized by the society.

## 7. GLOSOLAN-Spec work plan 2021-2022

Activity	Responsible party	Deadline
<b>General assignments</b>		
Contact the ITPS Chair to ask for clearance on their role	GLOSOLAN Coordinator	January 2022
Collect inputs on the possibility of amendments to the GSP Soil Data Policy	GLOSOLAN Coordinator	January 2022
Inform GLOSOLAN members and working group members on the outcomes of the second plenary meeting on spectroscopy and move forward with establishing the steering committee	GLOSOLAN Coordinator	January 2022
<b>Capacity development</b>		
Organization of a series of webinars on the topic of spectroscopy equipment, together with the use of protocols, soil spectral library, installation, spectral modelling, etc.	GLOSOLAN-Spec Coordinator, Chair, Steering Committee, WGs, Manufacturers	February to December 2022 <ul style="list-style-type: none"> <li>- 4-6 sessions are expected for the first series of webinars 2022</li> <li>- The first session is expected to start from Feb</li> <li>- Schedules should be online by Jan</li> </ul>
Developing training material: <ul style="list-style-type: none"> <li>- Reading material for the use of soil</li> </ul>	GLOSOLAN-Spec Coordinator, Chair, Steering Committee, WGs, Partners.	These are ongoing activities from 2021, they are expected to be completed in 2022

<p>spectroscopy in soil analysis</p> <ul style="list-style-type: none"> <li>- Video courses for soil spectral modelling</li> </ul>		
<p>Training programme on the topics spectral measurement, spectral data management, spectral modeling, etc.</p> <ul style="list-style-type: none"> <li>- Online courses</li> <li>- Short intensive training programmes which can be hosted by different institutes.</li> <li>- Cost Action plan for funding support</li> </ul>	<p>GLOSOLAN-Spec Coordinator, Chair, Steering Committee, WGs</p>	<p>February to December 2022 Depending on COVID situation</p>
<p>Gathering advanced institutes/ research groups on soil spectroscopy for national capacity development under GLOSOLAN-Spec initiative</p> <ul style="list-style-type: none"> <li>- Inviting institutes to join this initiative</li> <li>- Asking institutes to provide a short summary of their work</li> <li>- Finalizing and publishing</li> </ul>	<p>GLOSOLAN-Spec Coordinator, Chair, Steering Committee, WGs</p>	<p>Started right after 2<sup>nd</sup> plenary meeting, all information is expected to be online before March 2022</p>

<p>information in GLOSOLAN website</p> <ul style="list-style-type: none"> <li>- Informing countries about this information and encouraging countries actively looking for collaborators from this database</li> </ul> <p>All information will be organized in a database to be used by the working group and GLOSOLAN members. Follow up actions will be taken with those willing to work with the GLOSOLAN</p>		
<p>Sending a questionnaire, to collect more detailed information about what specific technical support each lab needs for the development of soil spectroscopy. GLOSOLAN's activities can be more target orientated based on the results back from this questionnaire</p>	<p>GLOSOLAN Coordinator, GLOSOLAN-Spec Coordinator, Chair, Steering Committee, WGs</p>	<p>June 2022</p>
<p>Proficiency Test (PT) on Soil Spectroscopy</p>		
<p>Call for experts to join PT on soil spectroscopy</p>	<p>GLOSOLAN-Spec Coordinator, Chair, Steering</p>	<p>June 2022</p>

<ul style="list-style-type: none"> <li>- Confirmation on their interests to join PT</li> <li>- Developing a road map for PT on soil spectroscopy</li> <li>- Developing a technical specification for PT on soil spectroscopy</li> </ul> <p>All information will be organized in a database to be used by the working groups. Follow up actions will be taken with those willing to work with GLOSOLAN</p>	<p>Committee, WGs, GLOSOLAN Members</p> <ul style="list-style-type: none"> <li>- Regional champion labs</li> <li>- For developing technical specification, Eyal will take lead on NIR part. ICRAF will take lead on MIR part</li> </ul>	
<p>Call for labs to join PT on soil spectroscopy</p> <ul style="list-style-type: none"> <li>- Confirmation on their interests to join PT</li> <li>- Confirmation on their instrumental and lab capacities</li> <li>- call for soil samples</li> </ul> <p>All information will be organized in a database to be used by the working groups. Follow up actions will be taken with those willing to work with GLOSOLAN</p>	<p>GLOSOLAN Coordinator, GLOSOLAN-Spec Coordinator, GLOSOLAN Labs</p> <ul style="list-style-type: none"> <li>- The first round of PT can start with regional champion labs</li> <li>- GLOSOLAN will be looking for soil samples and sending soil samples</li> </ul>	<p>June 2022</p>
<p>Potential collaboration with P4005 working group</p>	<p>GLOSOLAN Coordinator, GLOSOLAN-Spec</p>	<p>June 2022</p>

<ul style="list-style-type: none"> <li>- Explore the possibilities to develop SOP or protocol for spectral measurement and publish it as open resource</li> <li>- Reopen communication with IEEE</li> </ul>	<p>Coordinator, Chair, P4005 Group Chairs</p>	
<p>Global Soil Spectral library &amp; Estimation Service</p>		
<p>Establishing a free estimation platform</p> <ul style="list-style-type: none"> <li>- Engage with estimation platform developers for hosting estimation platform</li> <li>- Communicating with FAO IT&amp;LEGA department for technical and legal procedures</li> <li>- Inviting few users for testing estimation platform</li> <li>- Detecting and fixing technical issues of platform</li> </ul>	<p>GLOSOLAN-Spec Coordinator, Chair, Steering Committee, WG members</p>	<p>2022 It depends on how the process moves forward in FAO LEGA</p>

<ul style="list-style-type: none"> <li>- Open the platform to public as a free service</li> </ul>		
<p>Contacting countries or labs who have existing soil spectral libraries, and who are building or interested to build a spectral library:</p> <ul style="list-style-type: none"> <li>- Looking for responsible individuals from the Steering Committee for each region, to support communication with labs</li> <li>- Confirming lab's willingness to share part of their spectral library for the estimation service purposes</li> <li>- Summarize information of all confirmed labs (e.g: contact information, data type, timeline, etc.)</li> </ul>	<p>GLOSOLAN Coordinator, Chair, Steering Committee, WG members</p>	<p>June 2022</p>

<p>Establishing a global soil spectral library for estimation purposes</p> <ul style="list-style-type: none"> <li>- Using open access data as starting point</li> <li>- Developing a guideline for establishing a global soil spectral library for estimation service</li> <li>- Sending a guideline to labs for reviewing and agreement</li> <li>- Communicating with Yusuf regarding GSP data policy</li> <li>- Publishing guideline</li> </ul>	<p>GLOSOLAN Coordinator, Chair, Steering Committee, WG members</p>	<p>September 2022</p>
<p>Projects and Publications</p>		
<p>Writing project proposals and concept note to cover the following costs:</p> <ul style="list-style-type: none"> <li>- The implementation of the National Capacity Development, including training, the program, instrument procurement, etc.</li> <li>- Organization of PT among regional champion laboratories</li> </ul>	<p>GLOSOLAN Coordinator, Chair, Steering Committee</p>	<p>Through all the year 2022</p>

<ul style="list-style-type: none"> <li>- Development of the global spectral library and the global SOC estimation service</li> <li>- Development of the national soil spectral labs, national soil spectral library and estimation service</li> </ul>		
<p>A scientific publication to report GLOSOLAN-Spec initiative</p> <ul style="list-style-type: none"> <li>- Identify a group of scientists to join this publication</li> <li>- Outline the scope of this publication</li> <li>- Decide targeting journal</li> <li>- Writing</li> </ul>	<p>GLOSOLAN Coordinator, Chair, Steering Committee, WG members</p>	<p>Submit by end of 2022</p>
<p>A responding letter to EJSS paper on behalf of steering committee</p>	<p>GLOSOLAN Coordinator, Chair, Steering Committee</p>	<p>Submit by early 2022</p>

## 8. Venue and Time of the Next Meeting

The third plenary meeting on soil spectroscopy will take place in virtual format between September and November 2022.

## Annex I. Agenda



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GLOBAL SOIL  
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### **Second Plenary Meeting on Spectroscopy**

**From 2 to 4 November 2021**

**From 11 AM to 1 PM GMT+1**

**Online meeting – Zoom platform**

2 November 2021

11:00 - 11:10AM GMT+1	Opening	Mr. Ronald Vargas, GSP Secretary, FAO Ms. Nopmanee Suvannang, GLOSOLAN Chair
11:10 – 11:15 AM GMT+1	Endorsement of the agenda and group picture	Ms. Lucrezia Caon, GLOSOLAN Coordinator, FAO
11:15-11:30 AM GMT+1	<b>Item 1.</b> Report on the work performed by the Initiative in 2020-2021	Richard Ferguson, Charles E. Kellogg Soil Survey Laboratory, USDA Mr. Yi Peng, GLOSOLAN Coordinator on Spectroscopy, FAO
11:30 – 12:40 PM GMT+1	<b>Item 2.</b> Identification of areas for improvement followed by an open discussion <ul style="list-style-type: none"> <li>• New objectives of the GLOSOLAN initiative on Soil Spectroscopy</li> <li>• Governance</li> <li>• Webinars and training material</li> <li>• Writing of Standard Operating Procedures (SOP)</li> </ul>	Mr. Yi Peng, GLOSOLAN Coordinator on Spectroscopy, FAO  Ms. Lucrezia Caon, GLOSOLAN Coordinator, FAO
12:40 – 12:50 PM GMT+1	<b>Item 3.</b> Short presentation of the candidates for the position of GLOSOLAN-Spec Chair	
12:50 1:00 PM GMT+1	Closure of the first day of meetings and introduction to the second day	

3 November 2021

**Global Spectral Estimation Service**

11:00 - 11:25 PM GMT+1	<b>Item 4.</b> Global Soil Spectroscopy for the Common Good	Mr. Raphael VISCARRA ROSSEL, Curtin University, Australia
11:25-12:15 PM GMT+1	<b>Item 5.</b> Discussion on the establishment of a global spectral estimation service through a country driven approach	Mr. Yi Peng, GLOSOLAN Coordinator on Soil Spectroscopy Mr. Yusuf Yigini, GSP/FAO
12:15- 1:00 PM GMT+1	<b>Item 6.</b> National/Regional Soil Spectral Libraries: <ul style="list-style-type: none"><li>• A Mediterranean soil spectral library as an example for data harmonization and countries collaborations Mr. Eyal Ben Dor (10')</li> <li>• New soil spectroscopy projects within a European Joint Programme on Agricultural Soils (EJP SOIL) Ms. Johanna Wetterlind (10')</li> <li>• Combining systematic field assessments with soil spectroscopy to build a geo-referenced global spectral library across the tropics Ms. Leigh Ann Winowiecki (10')</li></ul> 15 minutes for Q&A	Moderator: Ms. Lucrezia Caon, GLOSOLAN Coordinator, FAO

1:00 PM GMT+1	Closure of the second day	
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4 November 2021		
Global Spectral Estimation Service		
11:00- 12:00 PM GMT+1	<p><b>Item 7.</b> Organization of a Global Proficiency Test (PT) on Soil Spectroscopy</p> <ul style="list-style-type: none"> <li>• Decide which range of spectra for PT (Vis-NIR or MIR or both)</li> <li>• Call for experts and labs to develop road maps</li> <li>• Potential collaboration with P4005 working groups</li> <li>• Call for soil samples</li> </ul>	<p>Mr. Yi Peng, GLOSOLAN Coordinator on Soil Spectroscopy, GSP/FAO</p> <p>Mr. Filippo Benedetti, GLOSOLAN Alternate Coordinator, GSP/FAO</p>
12:00-12:30 PM GMT+1	<p><b>Item 8.</b> Webinars and Trainings</p> <ul style="list-style-type: none"> <li>• Country's needs for training</li> <li>• Potential topics for next year's online seminar</li> <li>• Call for speakers</li> </ul>	<p>Mr. Filippo Benedetti, GLOSOLAN Alternate Coordinator, GSP/FAO</p>
12:30-1:00 PM GMT+1	<p><b>Item 9.</b> Wrap up on the GLOSOLAN Work Plan on Soil Spectroscopy for the Year 2021-2022</p> <p>With a reflection on:</p> <ul style="list-style-type: none"> <li>• Project proposal writing</li> <li>• Concept note writing</li> </ul>	<p>Moderator: Mr. Yi Peng, GLOSOLAN Coordinator on Soil Spectroscopy, GSP/FAO</p>

1:00 PM GMT+1	Election of the GLOSOLAN-Spec Chair and closure of the meeting	
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## Annex II. List of participants

From the GSP Secretariat, FAO:

- Ms. Lucrezia Caon, GLOSOLAN Coordinator
- Mr. Yi Peng, GLOSOLAN-Spec Coordinator
- Mr. Filippo Benedetti, GLOSOLAN Alternate Coordinator
- Mr. Yusuf Yigini, GSP/FAO

First Name	Last Name	Institute	Country
		Aarhus University, Agro University Laboratory	Denmark
		Sgs Portugal	Portugal
		Agrocares Golden Standard Laboratory	Netherlands
	Ibadan	Iita Analytical Service Laboratory Ibadan	Nigeria
Abdal	Salehpour	Mirza Sugarcane Corporate	Iran
Abdelmagid	Elmobarak	Abdelmagid Ali Elmobarak	Sudan
Abdourahaman	Moustapha	Laseve/ Inran	Niger
Abdul	Mouazen	Precision Scoring	Belgium
Abdul	Jabbar	Farm Advisory Center, FFC Sheikhupura	Pakistan
Alassane	Traore	Institut De Technologie Nucléaire Appliquée	
Aldis	Butlers	Laboratory Of Forest Environment	Latvia
Aldis	Butlers	Laboratory Of Forest Environment	Latvia
Aldwin	Pablo	Soils Laboratory	
Ana	Coria Téllez	Ana Coria Téllez	México
Andis	Lazdiņš	Laboratory Of Forest Environment	Latvia

André Marcelo	De Souza	Embrapa Soils	Brasil
Andrew	Sila	Icraf	Kenya
Angus	Mcelnea	DES Chemistry Centre	Australia
Anna	Ndiaye	Cereslocustox	Senegal
Annapurna Visalakshi Devi	Piniseti	Angrau	India
Anne	Muriuki	National Agricultural Research Laboratories	
Ariuntsetseg	Dugar	Soil Agrochemistry Laboratory	Mongolia
Arlindo	Manhica	Soil Water And Plant Laboratory	
Arlindo	Manhica	Agricultural Research Institute Of Mozambique-Soil, Plants And Water Laboratory -IIAM	Mozambique
Arti	Kumari	ICAR-RCER	India
Asa	Gholizadeh	Czech University Of Life Sciences	Czech Republic
Asghar	Khan	Pinstich	Pakistan
Asma	Belouanas	Rendement Plus	Algeria
Asma	Belouanas	Rendement Plus	Algeria
Aung Kyaw	Thu	Irrigation Water Quality Laboratory	Myanmar
Bas	Van Wesemael	Earth And Life Institute, Uclouvain	Belgium
Baz Muhammad	Waseem	Soil Research Laboratory, Srd, Aria, Mail, Kabul, Afghanistan	
Bc	Dhananjaya	Referral Soil Testing Laboratory	India
Belen	Marti	Belen Marti	United Kingdom
Ben	Ben Cai	Malvern Panalytical	United Kingdom
Bergil	Bernaldo	Bureau Of Soils And Water Management - Laboratory Services Division	

Biljana	Jordanoska Shishkoska	Laboratory For Quality Control Of Soil, Water, Fertilizers And Plant Material, "Scientific Tobacco Institute "- Prilep	Republic Of North Macedonia
Bo	Stenberg	SLU	Sweden
Branislav	Jović	Laboratory For IR Spectroscopy Faculty Of Science Novi Sad	Serbia
Brendan	Malone	CSIRO	Australia
Bright Fafali	Dogbey	Csir Soil Testing Laboratory	Ghana
Bruce	Shelley	Agriculture Victoria Research	Australia
Bwalya	Kalunga	Soil/ Plant Chemistry Laboratory ( ZARI)	Zambia
Carlos	Alexandre	Universidade De Évora	Portugal
Carlos	Peña	Biotec	Colombia
Carolina	Olivera	Xx	Xx
Cecile	Gomez	IRD	
Charles	Gowing	British Geological Survey	United Kingdom
Cheikh	Ahmed El Moctar	Laboratoire De Pédologie	Mauritanie
Chirag	Ternikar	lisc	India
Cho	Htwe	Land Use Laboratory	Myanmar
Christine	Gomez	ASTS	Asts
Christine	Magaju	ICRAF Soils Lab	Kenya
Cirad	Analyse	Cirad US Analyse	France
Clara	Rajadel	Mantlelabs	Austria
Claudio	Colombo	Pedology - Molise University	Italy
Clémence	Mariage	EESP-Gxabt Uliege	Belgium
Clemente	Zivale	Solo E Nutricao D Pantas - ISPM	Chimoio-Mozambique

Daniel	Auta Danjuma	National Soil Testing Laboratory, Kaduna.	Nigeria
Daniel	Carreira	Laboratorio Del Instituto De Suelos - Labis /INTA	Argentina
Danmore	Dzipange	Chemistry And Soils Pedology And Soil Fertility Laboratory	
Dany	Romanos	LARI	Lebanon
David	Hoover	USDA	Usa
David	Čižmár	UKZUZ Brno	Czech Republic
Deeksha	Krishna	Fiji	Fiji
Dickens	Ateku	Dickens Ateku	Kenya
Djeneba	Dembele	Soil-Water-Plant Laboratory (LSEP)	Mali
Djicknack	Dione	Laboratory Of Gamma Spectrometry.	
Ella	Shiningaymwe	Agricultural Laboratory	Namibia
Elvis	Weullow	Soil Plant Spectral Diagnostics Laboratory CIFOR ICRAD	Kenya
Ermias	Betemariam	ICRAF	Kenya
Evangeline	Valdez	F.A.S.T. Laboratories- Cubao	Philippines
Eyal	Ben Dor	Eyal Ben Dor	Israel
Fabricao	Terra	UFVJM	Brazil
Faisal	Sherif	FEE Lab	United States
Fassil	Kebede	CESFRA Soil Spectroscopy Laboratory	Morocco
First	Joseph	Soil Laboratory Of Instituto Superior Politecnico De Manica	Mozambique
Francis	Rubianes	Soils Lab, IRRI	Philippines
Gaofengwe	Ntoko	BETACH	Botswana

Gaturu		ICRAF Soil-Plant Spectral Diagnostics Laboratory	Kenya
Gerame	Calapre	Department Of Agriculture RFO VII - Regional Soils Laboratory	Philippines
Gideon	Musukwa	University Of Zambia Soil Science Service Laboratory	Zambia
Giorgi	Ghambashidze	Giorgi Ghambashidze	Georgia
Giuliana Shelly	Lizana Flores	Laboratorio De Microbiología De Suelos	Perú
Glosolan	De Hayr	Glosolan	Australia
Gordon	Price	Canada	Ontario
Grace	Ndege	Soils	Kenya
Guillaume	Kouassi	SOUBRE&SINEMATIALI (CIFOR-ICRAF)	Cote D'ivoire
Guillaume	Debaene	IUNG-PIB	Poland
Gulzhan	Yerlan	«Analytical Complex International Laboratory»	Kazakhstan
Haifa	Almohammad	Jordan	Jordan
Hamood	Al Hashmi	Soil & Water Laboratory	Oman
Hoang	Cao	Hoang Cao	
Hristina	Poposka	Laboratory For Soil Quality, Fertilizers And Plants	Republik Of North Macedonia
Huriye	Bayram	International Agricultural Research And Training Center IARTC/UTAEM Lab.	Turkey
Ibitoye	Abolarin	Soil Laboratory	
Idowu	Afolabi	National Soil, Plant And Water Laboratory	Nigeria
Isabelle	Verbeke	Fao	Italy

Isric World	Information	Isric World Soil Information	Netherlands
Issam	Barra	CESFRA/SSL- UM6P	Morocco
Janet	Lipai	National Agriculture Research Institute Chemistry Laboratory	Papua New Guinea
Jessica	Rodriguez Escobar	Biotec	Colombia
Joao	Coblinski	I-BEC	Greece
Johanna	Wetterlind	Swedish University Of Agricultural Sciences (SLU)	Sweden
John	Fajardo	John Fajardo	
Jorian	Heil	Rabobank	
Jose	Dematte	Jose Alexandre Melo Dematte	Brasil
José Manuel	Cena Velázquez	Labsuep-Fca	México
Juan Miguel	Guerrero Lázaro	Laboratorio De Análisis De Suelos, Plantas, Aguas Y Fertilizantes	Perú
Junior	Salong	Vanuatu Agriculture Department Soil Lab	Vanuatu
Juthamard	Kaiphom	Soil Analysis Technical Service Group	Thailand
Jutharat	Yimchaluay	Office Of Science For Land Development, Land Development Department	Bangkok
Kandula	Naga Madhuri	Soil-Plant-Manure-Wateranalysis Laboratory, ANGRAU,RARS, Tirupati	
Karim	Shahbazi	SWRI-Lab	Iran
Katherine	Todd-Brown	Katherine Todd-Brown	United States
Keith	Shepherd	Isda	Kenya
Kobra Sadat	Hasheminasab	Soil And Water Research Institute	Iran

Kobra Sadat	Hasheminasab	Soil And Water Research Institute	
Konstantinos	Karyotis	AUTH-RS	Greece
Kouassi	Ouffouet	Côte D'ivoire	Côte D'ivoire
Kuntal	M. Hati	Kuntal Mouli Hati	India
Lalitha	Manickam	NBSSLUP	India
Laura	Uribe	Laboratorio Tecnianalisis S.A.S.	
Laura Virginia	Bustamante Espinosa	México	Hidalgo
Lea	Piscitelli	Laboratory Of Agricultural And Environmental Chemistry	Italy
Leigh	Winowiecki	ICRAF	Kenya
Leo	Ramirez-Lopez	BUCHI	Switzerland
Lesego	Mooketsi- Selepe	Soil And Plant Analytical Laboratory	Botswana
Lijiali		无	China
Liza	Jofre Manquez	Agroanalisisi	Chile
Lucia	Martinez	Palawan Soils Laboratory	
M. Humair	Ahmed Malik	Soil Fertility, Land Resources Research Institute, Narc, Islamabad	Pakistan
Ma Aussielita	Lit	Asts	Philippines
Ma Kris	Tolentino	Da Rsl8	Philippines
Macoumba	Loum	Institut National De Pédologie (Sénégal)	
Maira	Kussainova	Sustainable Agriculture Centre	Kazakhstan
Manhal	Alzoubi		1 Syria
Mano	Veeragathipillai	Soil And Water Environmental Laboratory	Australia

María	Suarez	Laboratorio De Química De Suelos - LABOSUELOS-UASD U	Dominican Republic
Maria Carmela	Capule	Cri Environmental Corporation	Philippines
Maribeth	Yadao	0	
Marlies	De Kock	'-	
Martin	Luft	Bruker Optics	Germany
Marvin Jerome	Delos Santos	Philippine Coconut Authority - Laboratory Services Division	Philippines
Mary Elizabeth	Suson-Banda	Da Regional Soils Laboratory 5	Philippines
Mauricio	Silvestri	Laboratorio Kemia	Uruguay
Miguel	Estrada	Ninguno	Bolivia
Mila	Luleva	Mila Luleva	
Milan	Kališ	Soil Science And Conservation Research Institute	Slovakia
Miriam Mabel	Ostinelli	Laboratorio Del Instituto De Suelos - Labis/Inta	Argentina
Misheck	Chipwaila	Windmill	Zimbabwe
Mohamed	Elaissi	Biodevas Maroc	Morocco
Mohamed	Egueh Walieh	Djibouti	Djibouti
Mohammad Rafi	Salihzada	Parwan Province Soil Laboratory	
Mohammed	Mohammedzein	Soil Science Department/ Hungarian University Of Agriculture Sciences	
Mojgan	Yeganeh	Soil And Water Research Institute	Iran
Monoranjan	Mohanty	ICAR-Indian Institute Of Soil Science	India

Morris	Oromu	National Agricultural Research Institute, Professor John Kola Chemistry Laboratory	Papua New Guinea
Moses	Munthali	Chitedze Soils Laboratory	Malawi
Muhammad	Saleem	Soil And Plant Analysis Laboratory Department Agronomy Sindh Agriculture University Subcampus Umerkot Pakistan	Pakistan
Muhammad	Humza	FFC Soil And Water Testing Labs	Pakistan
Muhammad Abbas	Aziz	Fauji Fertilizer Company Limited	Pakistan
Muhammad Faheem	Shahid	Ffc Soil And Water Testing Lab	Pakistan
Musefa Redi	Abegaz	Soil Laboratory Of Harc	Ethiopia
Napatsorn	Notesiri	Office Of Science For Land, LDD	Thailand
Neil Yohan	Musadji	Laboratoire D'analyses Des Sols Et Environnement	Gabon
Nell	Peisley	Csiro Analytical Chemistry Group	Australia
Ni	Tint	Soil And Plant Analysis Laboratory	Myanmar
Nicolai	Bork	Foss	Denmark
Nicolas	Antoni	INREA	France
Nikolaos	Tziolas	Aristotle University Of Thessaloniki	Greece
Nishant	Sinha	ICAR-IISS, Bhopal	India
Njala University Quality	Laboratory	Njala University Quality Control Laboratory	Sierra Leone
Noman	Ahmad	Soil Chemistry	Pakistan
Nopmanee	Suvannang	Land Development Department	Thailand

Nuha	Khamis	Soil Analysis Laboratories Unit(SALU)	Sudan
Odipo	Osano	University Of Eldoret Biotech Center	Kenya
Olivia Klarina	Paraoan	Philippine Coconut Authority - Laboratory Services Division	Philippines
Oluremi	Olalekan	Institute Of Agricultural Research And Training Moor Plantation Ibadan	Nigeria
Onanong	Chomsiri	Office Of Science For Land Development Department, Land Development Department.	Thailand
Onder	Ozal	International Agricultural Research And Training Center	Turkey
Patrice	Kuitekam Dongo	National Laboratory For Diagnosis And Quality Control Of Agricultural Products And Inputs	
Patricia	Masikati	ICRAF	Zambia
Peter	Wilson	CSIRO	Australia
Philip	Bloesch	Chemistry Centre, Dept Of Environmental Science, Queensland Government	
Pierre	Roudier	Manaaki Whenua	New Zealand
Pinnara	Ket	ITC Soil Laboratory	Cambodia
Pinnara	Ket	Institute Of Technology Of Cambodia	Cambodia
Piyawan		Land Development Regional Office 3	Thailand
Pradip	Dey	ICAR-IISS	India

Prapaipit	Srimawong	Office Of Science For Land, LDD	Thailand
R S	Chaudhary	Spectroscopy Lab, Icar-liss, Bhopal India	India
Rachel	Murray	Analytical Services	New Zealand
Rafael	Jaco	FUSADES	El Salvador
Rafla	Attia	Lcas	Tunisia
Raphael	Viscarra Rossel	Curtin University	Australia
Ricardo	Maria	Soil And Plant Tissue Central Laboratory, IIAM	
Rich	Ferguson	Kellogg Soil Survey Laboratory	Usa
Robin	Chacha	Robin Chacha	Kenya
Rolf Mabicka	Obame	Laboratoire D'analyses Des Sols Et Environnement	Gabon
Romina	Baku	Laborator Of Agricultural Technology Transfer Center Fushë Krujë	Albania
Rong	Zeng	Rong Zeng	中国
Rosa	Martínez	Laboratorio De Suelo, Agua Y Planta	Mexico
Rosalie	Laxamana	Regional Soils Laboratory - Department Of Agriculture RFO III	Philippines
Rose	Ndango	IITA	Cameroon
Rosemarie	Oliva	Philippines	Philippines
S	Dharumarajan	Nbss&Lup	India
Sabine	Chabrilat	GFZ Spectroscopy Lab	Germany
Sadeq J. H.	Dwenee	Soil Chemistry Lab.	Iraq
Saidou	Addam Kiari	LASEVE	Niger

Sanjay	Kumar	Sindh Agriculture University Sub-Campus Umerkot	Pakistan
Sarah	Barden	Sarah Barden	United Kingdom
Sevinc	Madenoglu	TGSKMAE Turkey	Turkey
Seyed Hashem	Hashem	Khakazma Pars	Iran
Shamim Al	Mamun	Soil And Organic Waste Management	Bangladesh
Shunhua	Yang	Soils In Time And Space	China
Shuo	Li	Key Laboratory For Geographical Process Analysis & Simulation Of Hubei Province	China
Solaf	Halloum	Lattakia Lab	Syria
Songchao	Chen	ZJU-HIC	China
Sougueh	Cheik	Pedology Lab, CERD	Djibouti
Sreenivas	Ch	ANGRAU, Maruteru	India
Suleiman	Bello	Soil Science Laboratory, King Abdulaziz University	Saudi Arabia
Suleiman	Garba	Phosphorus Laboratory	Nigeria
Sumitra	Watana	Office Of Science For Land Development	Thailand
Surajo M.	Usaini Rimi	National Soil Testing Laboratory Complex, Kaduna	Nigeria
Suzan	Massier	Rabobank	NI
Tacettin	Öztürk	Lita Analytical	Turkey
The James	Institute	The James Hutton Institute	United Kingdom
Thembinkosi	Mbedzi	University Of Zimbabwe	Zimbabwe
Thomas	Terhoeven-Urselmans	Croplnuts UK	Uk

Tiburce Brice	Oussou	L2a2s2e	Benin
Tipanun	Upanisakorn	Office Of Science For Land Development Department	Thailand
Titia	Mulder	Soil Geography And Landscape Group, Wageningen University	Netherlands
Tonderai	Chihota	Superfert	Zimbabwe
Toure	Youssef	Côte D'ivoire	Nigeria
Trust	Manyiwa	BIUST Soil Science Teaching Laboratory Soil Science Lab ), Botswana	Botswana
Valentine	Karari	ICRAF Soil-Plant Spectral Diagnostics Laboratory	Kenya
Valerie	Azzi	Lebanese Agriculture Research Institute	Lebanon
Valmire	Havolli	KIA	Kosovo
Veda	Obando	CORBANA	Costa Rica
Veronica	Migo	Environment And Bioprocess Engineering Laboratory	Philippines
Vladimir	Ilinkin	CENTRAL LABORATORY At Nikola Poushkarov ISSAPP	Bulgaria
Wanwisa	Pansak	Mahidol University	
Washington	Mutatu	Zimbabwe Sugar Association Research Institute	Zimbabwe
Xinxinmeng		Key Laboratory For Geographical Process Analysis & Simulation Of Hubei Province	China
Yiyun	Chen	Wuhan University	China
Zainal	Abedin	Central Laboratory, Resource Development Institute	Bangladesh

Zenepe	Dafku	Agricultural University Of Tirana	Albania
云志	冯	WHU	China
小童	艾	Wuhan University	China
然	崔	土壤实验	China

## Annex III. Decision Document GLO/II/2021

**Decision Document GLO/II/2021:** Review the objectives of the *GLOSOLAN Initiative on Soil Spectroscopy*. To be discussed on 3 November 2021.

### Background

The first plenary meeting on soil spectroscopy of the Global Soil Laboratory Network (GLOSOLAN) was virtually organized, by the Global Soil Partnership (GSP) on 23-25 September 2020, on the online platform Zoom (report available at <https://www.fao.org/3/cb2220en/cb2220en.pdf>). During the meeting GLOSOLAN members agreed on the 2020-2021 work plan of the Soil Spectroscopy Initiative (GLOSOLAN-Spec) and the objectives of the initiative:

1. Build a globally representative soil spectral calibration library (database), based on Mid Infrared (MIR) Spectra and the accompanying soil property reference data recorded in one gold-standard reference laboratory;
2. Provide a freely available and easy-to-use soil property estimation service based on this evolving library;
3. Support countries in their contributions to the GLOSOLAN soil spectral library (named the Global Soil Spectral Calibration Library) and their use of the soil property estimation service;
4. Harmonize soil spectroscopy methods (including soil sample preparation, spectral measurement, and quality assurance of data analysis) by developing standards and protocols; and
5. Help countries build their capacity for estimating soil properties using soil spectrometry.

However, during the implementation of activities in 2021 the following concerns were expressed, by the soil spectroscopy community to the GLOSOLAN Coordinators:

- GLOSOLAN-Spec should adopt a broader definition of soil spectroscopy; to include other spectral ranges (e.g. visible and near infrared) and the use of different spectrometer technologies (e.g. benchtop research grade instruments, portable, handheld or miniaturized spectrometers). This because , (1) different spectral ranges and different technologies have unique

advantages and disadvantages for soil analysis, and (2) countries and institutions have different capacities and needs resulting in a variety of soil spectroscopy's adoption and development modalities.

- National capacity development was not sufficiently included in the work plan of GLOSOLAN-Spec. More attention should be paid to train soil spectral laboratories, support the development of national/regional soil spectral libraries via the estimation service, and to the provision of advisory services on suitable instrumentation.

Based on this, GLOSOLAN found appropriate to propose its members to review the objectives of the GLOSOLAN-Spec initiative and the work plan on the establishment of global spectral estimation services.

## **Proposal**

Participants to the second plenary meeting on soil spectroscopy are kindly asked to review the revised objectives of the GLOSOLAN-Spec, below:

- To support the development of all types of soil spectroscopy at national, regional, and global levels. To achieve this objective, this initiative will be supervised by a group of experienced scientists to ensure that all activities are science based.
- To support countries in establishing their own soil spectral laboratories and national soil spectral libraries with standardized methods and decentralized estimation services. To achieve this objective, GLOSOLAN will be using a country-driven approach and invest in capacity building activities at the national or regional level.
- To continuously support the development of the global spectral estimation services by encouraging countries to share part of their existing national soil spectral libraries on a voluntary basis.
- Support the development of standards and protocols for soil spectroscopy, including but not limited to soil sample preparation, measurement protocols, quality assurance, data analysis and modeling.

## **The Establishment of Global Spectral Free Estimation Services**

The priority of GLOSOLAN-Spec is to support countries to establish their own soil spectral laboratories and national soil spectral libraries with and estimation service. Once national soil spectral libraries are established, GLOSOLAN will connect them for the purpose of establishing global spectral free estimation services, for the different spectral techniques. The development of such global spectral free estimation services will be voluntary:

- With the support of its partners, GLOSOLAN will first start to establish a global spectral estimation service based on current available open data resources and existing estimation platform.
- A country can decide whether they are willing to join the development of global spectral estimation services or not, if not, GLOSOLAN will continue to support countries for further development of their capacities as described above. Countries can also decide to join the development of global spectral estimation service at any time and without a particular contribution.
- A country can decide how much data to share for the establishment of global spectral estimation services.
- A country can decide whether the shared data will be an open resource or only used for the global estimation service. The condition of using such dataset for research and other purposes should be discussed and documented.
- The shared soil spectral library, from countries, will be hosted by GLOSOLAN; only for providing estimation service purposes. GLOSOLAN only hosts such dataset under the framework of GSP data policy, and the country should have a full data license.

### **Decisions to Make at the 2<sup>nd</sup> Plenary Meeting on Soil Spectroscopy**

GLOSOLAN is kindly asking participants to the *2<sup>nd</sup> Plenary Meeting on Soil Spectroscopy* to endorse the revised objectives of GLOSOLAN-Spec and the proposed global spectral estimation service, through a country driven approach.

## Annex IV. Decision document GLO/I/2021

**Decision Document GLO/I/2021**: Review the governance of the *GLOSOLAN Initiative on Soil Spectroscopy*. To be discussed on 2 and 4 November 2021.

### **Background**

The first plenary meeting on soil spectroscopy of the Global Soil Laboratory Network (GLOSOLAN) was virtually organized, by the Global Soil Partnership (GSP) on 23-25 September 2020, on the online platform Zoom. During the meeting, GLOSOLAN members agreed on the Soil Spectroscopy Initiative (GLOSOLAN-Spec) to be represented by one or more working group leaders, and to count on the support of a working group, organized in sub-groups, based on the GLOSOLAN work plan for soil spectroscopy (Terms of Reference for these positions available in Annex III of the meeting report). In this regard, in 2020-2021, the following sub-groups were established:

- General working group on soil spectroscopy: tasked to answer general questions and requests for help from GLOSOLAN members. This working group should be involved in the review of technical documents and training materials;
- Working group on the development of the global soil spectral calibration library: tasked to technically advise and support the development of the library;
- Working group on the development of the global soil property estimation service: tasked to technically advise and support the development of the estimation service.

However, in 2020-2021, GLOSOLAN noticed that the current governance does not cover all soil spectroscopy related activities in the working groups efficiently. Only a few working groups' meetings were organized, and no follow-up actions were taken. This might result in a loss of interest of experts in the working groups in the *GLOSOLAN Initiative on Soil Spectroscopy*. In this regard, activities tended to be centralized within the working group leaders, and on few specific objectives.

### **Proposal**

GLOSOLAN proposes to review the governance of its Initiative on soil spectroscopy. The Initiative will be represented by only one Chair, supported by a Steering Committee and a working group.

The proposed Terms of Reference (TORs) for these positions are herewith reported. Please note, that no change is proposed to the TORs for the positions of regional champion laboratories and/or institutes on soil spectroscopy.

- **Chair on Soil Spectroscopy**

The *GLOSOLAN Initiative on Soil Spectroscopy (GLOSOLAN-Spec)* is led by the GLOSOLAN Chair on Soil Spectroscopy, who works in coordination with the GLOSOLAN Chair, the GLOSOLAN vice-Chair, and the GLOSOLAN Coordinators at the Global Soil Partnership. The term for the Chair is two years after election. The appointment of the Chair of GLOSOLAN-Spec and the extension of his/her mandate to a second term will take place during the annual plenary meeting on soil spectroscopy.

The Chair of GLOSOLAN-Spec should be selected based on the following criteria:

- Should be an internationally recognized expert on soil spectroscopy;
- Should belong to a laboratory registered to the GLOSOLAN network that preferably does both wet chemistry and spectral analysis;
- Should have time to commit to the implementation of the GLOSOLAN work plan;
- Not have any conflict of interest in regards to the objectives, data, and information of the Global Soil Partnership, GLOSOLAN, and the Soil Spectroscopy Initiative;
- Should demonstrate interest in all the areas of work of GLOSOLAN-Spec;
- Should agree on the GLOSOLAN vision and policy on transparency, partnership and equality.

The Chair is responsible for:

- i. Supporting and ensuring the timely implementation of the GLOSOLAN work plan on soil spectroscopy;
- ii. Reporting on spectroscopy activities at the annual GLOSOLAN meeting;
- iii. Representing the working group on spectroscopy and GLOSOLAN-Spec at any other GSP meetings or international events;
- iv. Supporting GLOSOLAN in capacity-building and financial-resources mobilization activities;

- v. Ensuring that the activities of the working groups are implemented according to the principles of GLOSOLAN, including transparency, inclusivity, and mutual respect; and
- vi. Facilitate the communication between GLOSOLAN and independent projects and initiatives on soil spectroscopy.

- **Steering Committee to GLOSOLAN-Spec**

The Steering Committee to GLOSOLAN-Spec will act under the direction of the GLOSOLAN Chair on Soil Spectroscopy with the support of the GLOSOLAN Chair and the GLOSOLAN Vice-Chair. The GLOSOLAN Coordinators will provide support as facilitators.

All members of the Steering Committee should:

- Be top experts on the topic of soil spectroscopy;
- Represent institutions with a major regional or global role on soil spectroscopy;
- Have time to commit to implement the GLOSOLAN work plan on soil spectroscopy; and
- Not have any conflict of interest in regards to the objectives, data, information of the Global Soil Partnership, GLOSOLAN, and the Soil Spectroscopy Initiative

The GLOSOLAN Chair, Vice-Chair, and the ITPS representative in GLOSOLAN are members of the Steering Committee by default. Overall, the Steering Committee should be represented by experts that can provide an opinion on all aspects of soil spectroscopy. In this regard, the Steering Committee is tasked to:

- Advise and help the working group as needed;
- Identify the priorities in the work plan of GLOSOLAN-Spec – where the most energy should be directed;
- Identify and monitor potential risks related to the implementation of activities in the GLOSOLAN-Spec work plan;
- Provide input to the development of project proposals;
- Monitor and assess the quality of the GLOSOLAN-Spec outputs as they develop;

- Make urgent recommendations and sometimes decisions that cannot wait for the organization of a plenary meeting.

Members of the Steering Committee meet three times per year. One time, after the plenary meeting, to review the decisions made by GLOSOLAN members. Another time, six months after the plenary meeting, to review and assess progress and needs. And again, right before the next plenary meeting, to review progress and advice on the upcoming plenary meeting. Additional meetings of the Steering Committee can be organized as needed.

- **Working Group on Soil Spectroscopy**

The technical working group will act under the direction of the Chair of GLOSOLAN-Spec, the GLOSOLAN Chair and the GLOSOLAN Vice-Chair. The GLOSOLAN Coordinators will provide support as facilitators.

All members of the working group should:

- Be experts on the topic of soil spectroscopy;
- Have time to commit to implement the GLOSOLAN work plan on soil spectroscopy;
- Not have any conflict of interest in regards to the objectives, data, information of the Global Soil Partnership, GLOSOLAN, and the Soil Spectroscopy Initiative.

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; (1) 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 (2) 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).

In accordance with 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. 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 Coordinators and the Chair of GLOSOLAN-Spec should ensure to the best of their ability that the working group has an appropriate geographical balance, representation of members and coverage of topics. 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.

The 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 library and the development of tools for its applications;
- 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.

- **New members of the working group**

Experts interested in joining the working group can send an expression of interest to the GLOSOLAN Coordinators 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 Coordinators and the GLOSOLAN Chair on Soil Spectroscopy 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.
- 
- **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 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 progression is based on the willingness of its members, to jointly achieve a common goal. In this regard, all members should commit to a positive and constructive approach that facilitates the work

### **Decision to make at the 2<sup>nd</sup> Plenary Meeting on Soil Spectroscopy**

GLOSOLAN is kindly asking participants to the 2<sup>nd</sup> Plenary Meeting on Soil Spectroscopy, to endorse the revised governance of the *GLOSOLAN Initiative on Soil Spectroscopy*, and the proposed Terms of Reference (TORs) for the positions of GLOSOLAN Chair on Soil Spectroscopy, Steering Committee and working group.

