Food and Agriculture Organization of the United Nations

7th Meeting of the International Network of Soil Information Institutions (INSII)

09-10-11 November 2021

Online meeting

GLOSOLAN-Spec

Yi Peng – FAO/GSP

INSII

GLOBAL SOIL PARTNERSHIP

The GLOSOLAN Initiative on Soil Spectroscopy (GLOSOLAN-Spec) was launched in April 2020 at the purpose of building the capacity of soil laboratories on the use of this technology by bringing together institutions and experts from all around the world on the topic

GLOSOLAN-Spec achievements

Soil spectroscopy webinars

SESSION 1: An Introduction to Soil Spectroscopy

Monday, 6 September 2021 | 15:00 CET

Guest speaker: Bo Stenberg

Biography: Bo Stenberg is an associate professor in soil science from the Swedish University of Agricultural Sciences. He is the research leader at 'Precision Agriculture and Pedometrics', Department of Soil and Environment. His research interests focus on digital soil mapping and variable rate fertilizer application in precision agriculture system, farm soil mapping, proximal soil sensing, diffuse near infrared spectroscopy for soil analysis, three dimensional soil mapping.

Abstract: This webinar will review the basic mechanisms for soil visible–near infrared (vis–NIR) spectroscopy. It will also provide information on applications related to precision agriculture and the use of large regional soil spectral libraries for estimating small scale variations.

Register here | Details of the event

SESSION 2: Soil Spectroscopy for accurate measurement of soil physical and chemical soil properties

Thursday, 16 September 2021 | 09:00 CET

Guest speaker: Budiman Minasny

Biography: Budiman Minasny is a professor in soil-landscape modelling at the University of Sydney. He is the theme leader of soil, carbon, and water at Sydney Institute of Agriculture. He is a soil scientist, previously awarded the QEII and the Future Fellowships from the Australian Research Council. He is recognized as a Highly Cited Researcher in 2019 by the Web of Science. He is passionate about the role of soil in managing climate change, food, water, energy security, and maintaining biodiversity.

Abstract: This webinar will present how soil spectroscopy can characterize extensive different soil physical and chemical soil properties.

Register here | Details of the event

SESSION 3: A future for soil spectral inference

Thursday, 23 September 2021 | 08:00 CET

Guest speaker: Alex McBratney

Biography: Alex McBratney is a world-leading soil scientist who conceived and developed pedometrics, digital soil mapping and soil security, radically strengthening the knowledge base of soil science. He established new theory and empirical models of soil variation in landscapes and developed their applications. His contributions have revolutionised the availability of soil information and led to improved agricultural practices with reduced environmental impacts and enhanced security of the world's soil.

Abstract: This webinar will present the definition and role of soil spectroscopy for laboratory as well as field measurement and will speculate on possible novel approaches.

Register here | Details of the event

- Six online webinars
- A total of 5959 registrations from 142 countries
- A total of 2607 participants joined live session
- Video recordings
- Questions and discussions

SESSION 4: The Brazilian Soil Spectral Library Experience from scientific to society services

Monday, 4 October 2021 | 15:00 CET

Guest speaker: José Alexandre M. Demattê

Biography: Dr. José A. M. Demattê is currently a Full Professor in the Department of Soil Science, Luiz de Queiroz College of Agriculture, University of São Paulo, Brazil. He has basic formation in Pedology with a carrier in Remote Sensing Applied to Soils in last 30 years. He has extensive experience from the research world to practice in the field, agriculture industry, soil management, mapping, precision agriculture, soil tillage, productivity systems and soil laboratories. Thanks to his wide experience he can bridge the real issues with the academic thinking. Currently, he leads the Brazilian Soil Spectral Library, the Brazilian Program on Soil Analysis via Spectroscopy. He is also member of the working group of the Pronasolos Brazilian Soil Mapping and MapBioma Programs.

Abstract: This webinar will present the 25 years' experience on constructing the Brazilian Soil Spectral Library, from scientific research purposes to the development of free estimation online service of soil analysis.

Register here | Details of the event

SESSION 5: Characterization of soil properties using French national Vis-NIR and MIR spectral libraries

Thursday, 14 October 2021 | 14:00 CET

Guest speaker: Cecile Gomez

Biography: Dr Cécile Gomez is involved in research dealing with Vis-NIR-SWIR (400 – 2500 nm) lab, field and remote sensing imagery for soil sciences studies. She has now around 12 year experience in lab and field soil spectroscopy, and in imaging spectroscopy (airborne and satellite supports) for extraction of physico-chemical soil properties. She was and is currently P.I. and Co-P.I. in national research projects and contributes to the definition of the French hyperspectral satellite (HYSP). She is a French Research Scientist at IRD (French Research Institute for Substainable Development) since 2007. She is currently associated with the Indo-French Cell for Water Sciences at IISc Bangalore (India).

Abstract: This webinar will present the national soil collection provided by the French national soil quality monitoring network. Based on this national database, several researches have been conducted for 10 years to highlight the potentials and issues of such national spectral databases.

Register here | Details of the event

SESSION 6: Measuring reflectance of undisturbed soil surface in the field under laboratory quality: A protocol to assess soil properties that are sensitive to the soil sealing phenomenon

Thursday, 28 October 2021 | 15:00 CET

Guest speaker: Eyal Ben-Dor

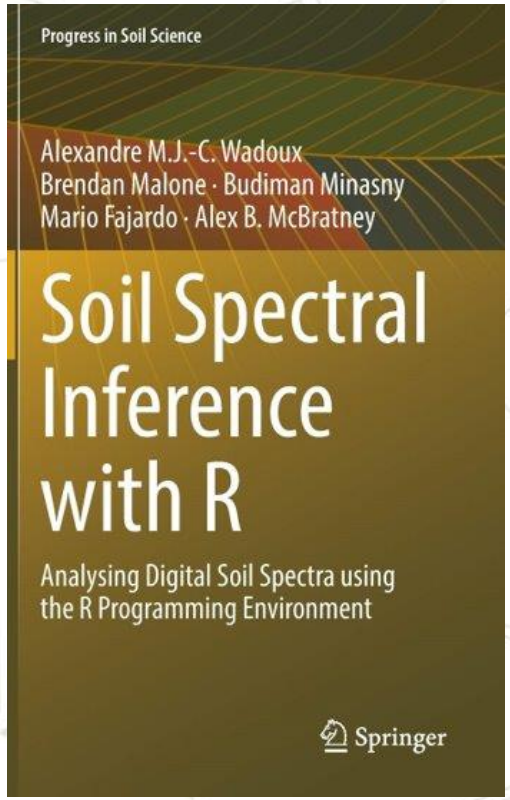
Biography: Prof. Eyal Ben-Dor is the Head of the Remote Sensing Laboratory at Tel Aviv University (RSL-TAU), the leading group in Israel for imaging spectroscopy (IS), soil spectroscopy and remote sensing applications dedicated to soil mapping and environmental monitoring. The RSL people are experts in field and airborne campaigns at national and international levels and have gained significant experience in many different projects.

Abstract: This webinar will cover a new developed device for measuring surface reflectance in the field to fill the gap between laboratory and field spectral measurements of the soil surface.

Register here | Details of the event

If you intend to participate in the webinar(s), please register using the above links. Upon registration, you will receive an automatic reply providing you with personal username and passcode to access the session which you registered for.

Report and training materials



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

1. Background

Visible and near infrared (vis-NIR) and mid-infrared (MIR) reflectance spectroscopy has emerged and developed in the past three decades as an important method for quantitative soil analysis in the lab (Baumgardner et al., 1985; Chang et al., 2001; Viscarra Rossel et al., 2006; Reeves III, 2010). Many researchers believe that vis-NIR and MIR can become an alternative to the conventional laboratory-based, wet-chemistry methods for soil analysis (Janik et al., 1998; Nocita et al., 2015). Various modern applications require large amounts for high-resolution (both in space and time), quantitative soil data. One examples is precision agriculture, where soil samples are collected from the field (e.g., in a grid pattern) and analyzed in the lab to generate soil property maps. These soil property maps then become

New GLOSOLAN-Spec objectives

2nd plenary meeting on GLOSOLAN-Spec

New objectives of the GLOSOLAN-Spec

- To support the development of all types of soil spectroscopy at national, regional, and global levels.

- To support countries in establishing their own soil spectral laboratories and national soil spectral libraries with standardized methods and decentralized estimation services.

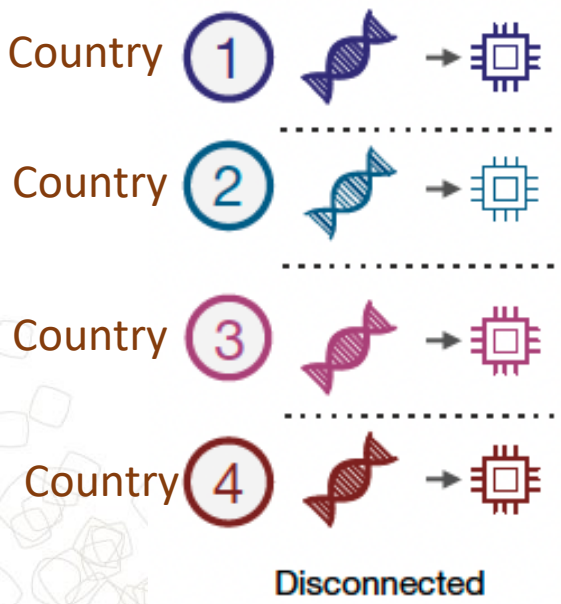
- To continuously support the development of the global spectral estimation services by encouraging countries to share part of existing national soil spectral libraries on a voluntary basis.

- To 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.

The establishment of global spectral free estimation services

The priority of GLOSOLAN-Spec : supporting countries to develop their own capacities

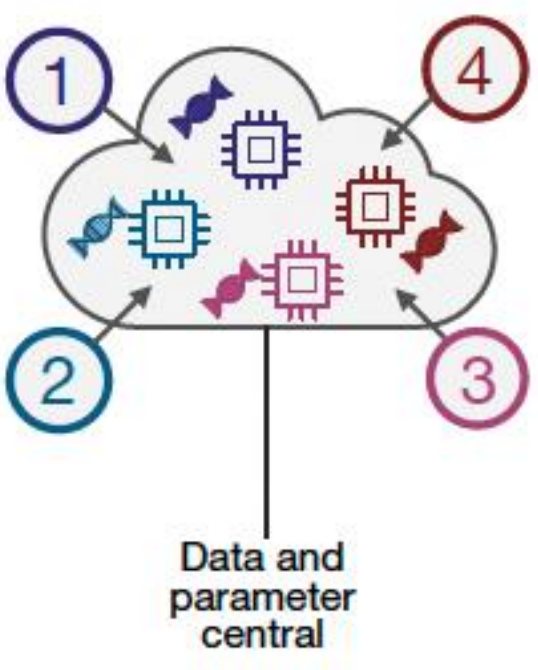
National libraries and estimation services



Shared national spectral library

Establishing global spectral free estimation services based on existing resources

Global spectral free estimation services



Warnat-Herresthal, S. et al. 2021 Swarm Learning for decentralized and confidential clinical machine learning. Nature 594, 265-270.

The establishment of global spectral free estimation services

- GLOSOLAN will first start to establish a global spectral estimation service based on current available open data resources and existing estimation platform.

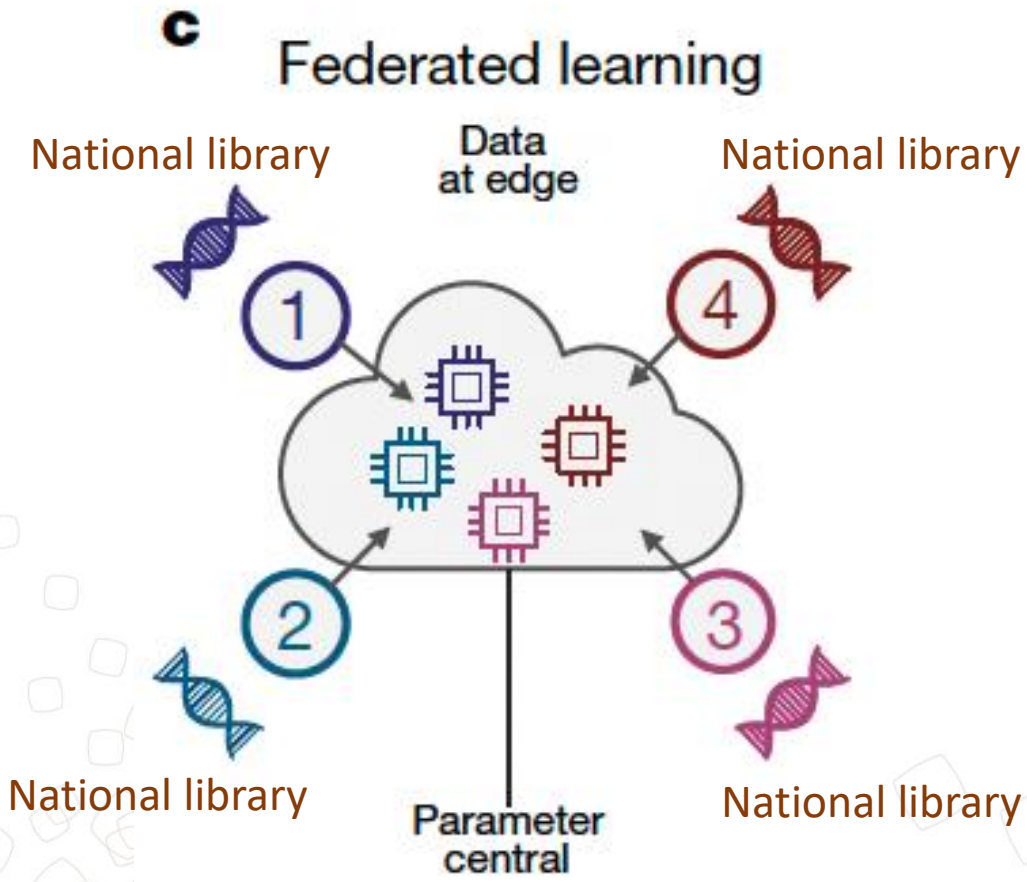
- A country will join the development of global spectral estimation services on a volunteer base.

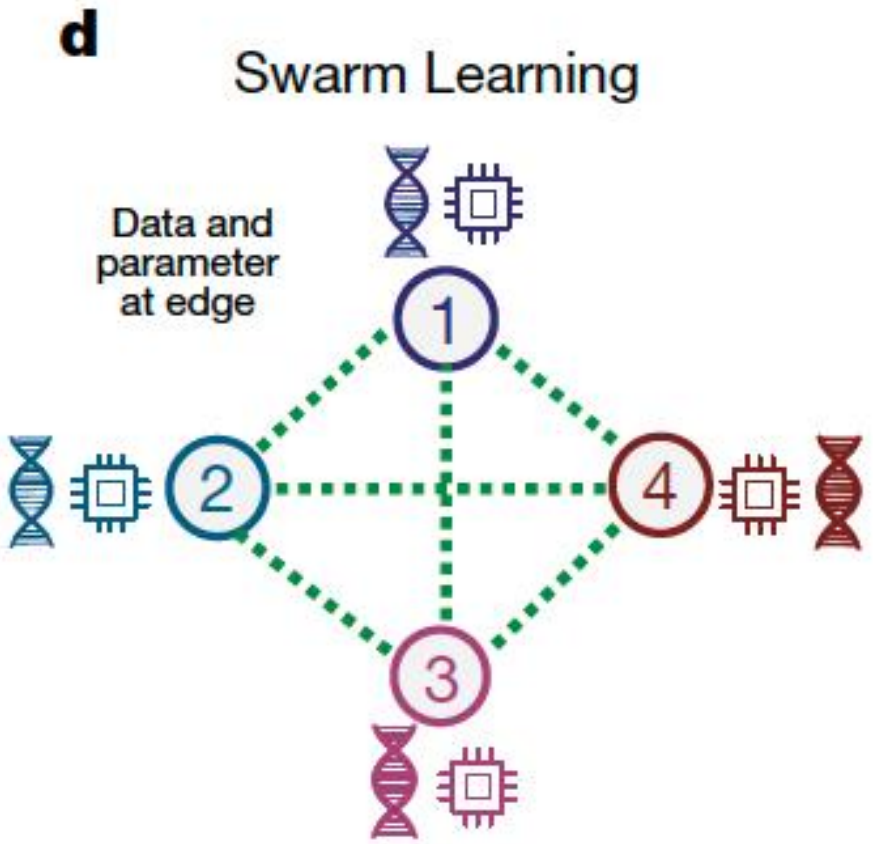
- A country can decide how much data to share for the establishment of global spectral estimation service.

- A country can decide whether the shared data will be an open resource or only use 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.

Ultimate goal on global spectral free estimation services





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Thank you

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