**Session Proposal**

# Session Title

Advances in soil health monitoring with proximal sensing

# Session Organizers

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Session Description

The accurate monitoring of soil-health indicators is of great importance for decision making in soil management, precision farming, food security, and climate change to achieve relevant sustainable development goals. The symposium will provide a scope for critical discussions about the significant potential of advanced proximal-sensing technologies along with innovative modeling strategies to improve current soil-health evaluations, which often rely on traditional methods that are time-consuming and costly. The increasingly available proximal sensing (e.g., visible-near-infrared, mid-infrared, portable X-ray fluorescence, and laser-induced breakdown spectroscopy, and electromagnetic induction) technologies enable objective, quantitative, reliable, rapid, cost-effective, scalable, and integrative soil-health monitoring. These proximal-sensing approaches can help to deal with the shortage of data on soil to better understand it and to meet the growing demand for information to assess the soil-health conditions. Numerous researches at scales ranging from regional to global for soil-health monitoring will be shared extensively between experts and those interested in this field. An integrated sensing approach that employs a combination of multiple proximal sensors, with the aim of simultaneous measurement of various soil-health indicators that are broadly applicable and technologically feasible will be outlined during the symposium. The symposium will also provide a networking opportunity for domestic/early-career soil scientists as well as established international soil scientists. Potential topics (keywords) include but are not limited to:

* Soil-health indicators/index (physical, chemical, and biological properties);
* Visible-near-infrared spectroscopy;
* Mid-infrared spectroscopy;
* Soil spectral library;
* X-ray fluorescence spectroscopy;
* Laser-induced breakdown spectroscopy;
* Electromagnetic induction;
* Sensor-data fusion;
* Integrative sensing;
* Machine/deep learning and artificial intelligence.

# Relevance

This session is highly relevant to the congress’s themes of ***Proximal Soil Sensing*** and ***Soil Monitoring*** as it includes the application of multiple new generations of sensors for soil health monitoring. Rapid screening techniques, such as visible-near-infrared, mid-infrared, X-ray fluorescence, and laser-induced breakdown spectroscopy, and electromagnetic induction, would substantially advance our ability to measure and manage soil health, ultimately improving soil ecosystem services. Emerging data analysis tools such as machine learning, deep learning, and explainable artificial intelligence will be explored more fully in order to quantify the effect of soil health indicators.

# Format

Oral presentations

# Proposed Speakers

1. Raphael A. Viscarra Rossel, Curtin University, a leading expert in the field of soil science, soil carbon science, soil-landscape modeling, sensing and spectroscopy, geostatistics, and environmental machine learning;
2. Eyal Ben Dor, Tel AViv University, a leading expert in the field of soil spectroscopy and hyper-spectral remote sensing;
3. José Alexandre M. Demattê, University of São Paulo, a leading expert in the field of advanced pedology, remote sensing, spectroscopy, and soil mapping and management;
4. Abdul Mounem Mouazen, Ghent University, a leading expert in the field of proximal soil sensing;
5. Zhou Shi, Zhejiang University, a leading expert in the field of proximal soil sensing, soil spectroscopy, and digital soil mapping;
6. Asim Biswas, University of Guelph, a leading expert in the field of digital and precision agriculture, digital soil mapping, proximal soil sensing, remote sensing, soil health, and sustainable soil management.