**Session Proposal**

# Session Title

Soil Organic Carbon Accounting Using Proximal Sensing: Advancing Sustainability Across Agricultural and Natural Ecosystems

# Session Organizers

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6. Dr. Francesco Fava, Department of Environmental Science and Policy, Università degli Studi di Milano, Via Celoria 2, Milan, Italy [francesco.fava@unimi.it](mailto:francesco.fava@unimi.it)
7. Dr. Tong Li, University of Queensland, Australia, [tong.li1@uq.edu.au](mailto:tong.li1@uq.edu.au) Primary Contact Person

# Session Description

This session aims to foster critical discussions on advancements and applications of proximal sensing technologies, with a focus on mid-infrared (MIR) and visible near-infrared (vis-NIR) spectroscopy. These tools offer cost-effective and precise solutions for estimating and monitoring soil organic carbon (SOC). Given SOC’s crucial role in enhancing agricultural productivity and supporting the sustainability of natural ecosystems such as grasslands and forests, the session will delve into the biogeochemical processes that drive SOC dynamics. It will also examine the potential of proximal sensing for measuring these processes and discuss strategies for integrating these technologies into sustainable land use and carbon management practices.

Proximal sensing technologies offer a cost-effective and efficient alternative for SOC estimation across diverse ecosystems, from agricultural soils to natural landscapes such as grasslands and forests. This session will showcase advancements in MIR and NIR technologies, highlighting their application in different ecological systems. Case studies from international collaborations, including the Australia-China Carbon Partnership project, will demonstrate the practical implementation of these technologies.

Key topics of discussion will include but no limit to:

* The integration of MIR and NIR technologies for SOC estimation.
* Advances in data preprocessing, calibration, and validation methods.
* Comparative insights on combining proximal sensing with remote sensing techniques for regional-scale SOC mapping.
* Practical solutions and strategies for promoting economically and technologically feasible SOC management practices.

This session will provide a valuable networking opportunity for early-career researchers and established soil scientists from various fields, fostering international collaborations and advancing climate-smart solutions for soil carbon management and ecosystem restoration.

# Relevance

This session aligns with the congress theme of “Soil and the Shared Future for Mankind” by addressing the key challenge of low-cost and accurate SOC measurement. It emphasizes innovations in proximal sensing and their role in achieving global climate and sustainability goals.

# Format

* Oral presentations by leading researchers and practitioners
* Panel view sight with academic and industry experts
* Interactive workshops/masterclass for early-career researchers and stakeholders
* Roundtable discussion
* Plan to launch one Special Issue at one international journal

# Proposed Speakers

* Dr. Tong LI, University of Queensland, Australia – A early career expert in soil organic carbon sequestration and measurement techniques.
* Dr. Anquan Xia, Development and Research Center (National Geological Archives of China), China Geological Survey, Beijing, China
* Prof. Xiaoyong Cui, University of the Chinese Academy of Sciences, China – Specializing in remote sensing applications for soil carbon management.
* Dr. Sean Manning, Ziltek, Australia – A pioneer in the development and application of MIR technology for SOC estimation. sean.manning@ziltek.com
* Dr. Gafur Gozukara, Eskisehir Osmangazi University, Department of Soil Science and Plant Nutrition, Eskisehir 26160, Turkey [ggozukara@ogu.edu.tr](mailto:ggozukara@ogu.edu.tr)
* Dr. Yakun Zhang Department of Crop and Soil Science, Oregon State University, 2750 SW Campus Way, Corvallis, OR, 97331, USA [zhang878@wisc.edu](mailto:zhang878@wisc.edu) A early career expert in soil organic carbon sequestration and measurement techniques.
* Prof. Alfred E. HARTEMINK, University of Wisconsin-Madison, Department of Soil Science, FD Hole Soils Lab, 1525 Observatory Drive, Madison WI 53706 (USA) [hartemink@wisc.edu](mailto:hartemink@wisc.edu). A distinguished career expert in soil organic carbon sequestration and measurement techniques.
* Matthias Kuhnert, Institute of Biological and Environmental Sciences, University of Aberdeen, Aberdeen, UK. [matthias.kuhnert@abdn.ac.uk](mailto:matthias.kuhnert@abdn.ac.uk) A distinguished career expert in soil organic carbon sequestration and measurement techniques.