**Session Proposal**

# Session Title

Application of advanced instrumental analysis techniques in soil science

# Session Organizers

Prof. Haoye TANG, Institute of Soil Science, Chinese Academy of Sciences, Email: hytang@issas.ac.cn (Primary contact person)

Prof. Hailin ZHANG, Department of Plant and Soil Sciences, Oklahoma State University

# Session Description

This session focuses on the application of advanced instrumental analysis techniques in soil science, exploring the methodologies and advanced technologies utilized to analyze soil properties and composition. Rapid advancements in instrumental analysis have enabled soil scientists to gain deeper insights into soil structure, nutrient content, contaminant concentrations, and microbial activity. This is evident from detailed studies on soil structure, viewed both as an art and a science, as well as comprehensive analyses of soil nutrients.

This session covers a wide range of instrumental techniques, including X-ray diffraction (XRD) for identifying minerals, X-ray fluorescence (XRF) for elemental analysis, nuclear magnetic resonance (NMR) for elucidating molecular structures, and gas chromatography-mass spectrometry (GC-MS) for detecting organic compounds. These methodologies yield high-resolution, quantitative, and qualitative data, which are pivotal for advancing soil science research.

This session will highlight the latest innovations in soil analysis instruments and their pivotal role in advancing precision agriculture and environmental monitoring. It will demonstrate how techniques, such as soil analysis, can offer profound insights into soil properties and composition, thereby playing a vital role in achieving sustainable and efficient soil management practices. Soil analyzers, equipped with advanced sensors and data analysis technologies, can rapidly and accurately measure key indicators such as moisture, organic matter, nutrients, and contaminants. This enables farmers to precisely understand soil fertility, develop scientific fertilization plans, and ensure the safety and quality of agricultural products. Moreover, soil analyzers support land management and environmental protection by monitoring soil quality on a large scale, aiding in the formulation of land use plans and soil restoration efforts. Attendees will acquire a thorough understanding of the current state-of-the-art in soil analysis and explore potential future trajectories for this field.

# Format

Oral presentations

# Proposed Speakers

Prof. Chu C（褚驰恒）， earned his Bachelor's degree from Peking University, Master's degree from the University of Tokyo, and Ph.D. from ETH Zurich. After completing his PhD in 2016, he conducted postdoctoral research at Yale University. In 2019,he joined the College of Environmental and Resource Sciences at Zhejiang University, where his research primarily focuses on environmental micro-interface chemical processes and pollution control, the nexus of environment, chemistry, geoscience, microbiology, material science, catalysis, nanotechnology, and mechanical engineering. The results are published in multiple specialized and interdisciplinary journals, including ES&T, PNAS, Nature Communications, JACS, Accounts of Chemical Research, ACS Catalysis, Adv. Funct. Mater., etc.

Prof. Youzhi Feng（冯有智）， Nanjing Forestry University, unveiling responses and feedback of soil microbial diversity and functions to global changes and further implementing nano-enabled practices to promote agroecosystem sustainability. These works have been published in Nature Sustainability, Nature Ecology & Evolution, Nature Cities, Nature Reviews Microbiology, Nature Communications, PNAS, Science Bulletin, Global Change Biology, Microbiome etc. high-impact journals.

Dr. Hu Zhou（周虎） is a Professor at the College of Land Science and Technology, China Agricultural University. He specializes in soil conservation and sustainable land use. He has led multiple projects from the National Natural Science Foundation of China (NSFC）and Ministry of Agriculture and Rural Affairs. He published over 90 peer-reviewed papers in leading soil science journals such as Geoderma, EJSS, SSSAJ. He also contributes to the academic community as Associate Editor or board member of Soil Use and Management, Soil, Geoderma.

Dr. Jiawen Zhou (周嘉文) now is an assistant professor at the Soil Environment and Remediation Research Division in the Institute of Soil Science, Chinese Academy of Sciences. He majors in phytoremediation of metal-contaminated soils and metal biogeochemistry in the soil-plant system. Using metal stable isotope techniques, he systematically traced metal transport mechanisms influenced by metal hyperaccumulators. He published more than 30 papers in the leading journals focusing on environmental science such as ES&T, JHM.

Liu Xianming (刘先明), currently serving as a Senior Application Engineer at Bruker analytic company, a prestigious company in the field of scientific instruments, has emerged as a prominent expert in the field of mass spectrometer imaging. His profound understanding and extensive practical experience allow him to excel in this specialized field, meticulously addressing intricate details and implementing advanced techniques essential for achieving highly accurate and efficient imaging. His responsibilities extend beyond the implementation of these technologies and should encompass continuous optimization and iterative innovation, strategically aligning with the dynamic requirements of scientific research.

Liu Yiyang (刘亦洋), currently serving as a senior application engineer at the esteemed Skalar analytic company, has exhibited outstanding proficiency in the specialized realm of continuous flow analysis. His expertise seamlessly encompasses the sophisticated application of elemental analysis, especially in the realm of soil science. With a profound understanding of both theoretical principles and practical techniques, he has consistently shown his proficiency in applying advanced analytical techniques that empower us to extract profound insights from the intricate tapestry of soil compositions.