GLASGOW22
22ND WORLD CONGRESS OF
SOIL SCIENCE

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31 July - 5 August 2022
SEC, Glasgow, UK

Call for Abstracts

Invitation to Submit

On behalf of the British Society of Soil Science and the International Union of Soil Sciences, we are delighted to invite soil scientists from around the world to submit abstracts for oral presentations and posters.

A list of sessions with short summaries of their content is given.

Abstract submissions are invited for the Interdivisional sessions, the Divisional scientific sessions, and the Working Group sessions. The convenors and chairs/vicechairs for each session will review the abstracts and propose the programme for oral and poster presentations.

Only the text of the abstract will be reviewed; author names, affiliations and biographies will not be considered during the selection process.

All posters will be available to view as pdfs via the conference website, and if the author attends the conference in person hard copies will be displayed continuously for 2 days.

Oral presentations will take place either in person in Glasgow or via the internet. Each oral presentation will be 15 minutes, including time for questions, with more time allocated to selected keynote papers.

The final programme will be designed to accommodate the accepted oral and poster presentations, reflecting the level of demand from participants.

Key dates
Submission deadline: **31 October 2021**
Acceptance notification: **January 2022**

If you have any queries following this document please head to the conference website www.22wcss.org or email us at wcss@speak.co.uk

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International Union of Soil Sciences

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Abstract Submission Process Overview

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Interdivisional Sessions

1. **Spatial decision making and mapping for implementing policies for sustainable soil management. Convenors: Fabio Terribile; Erika Michéli; Jack Hannam**

   Recent progress in soil mapping, soil geography and geospatial Decision Support Systems promises to deliver smart operational land planning and management tools for supporting policies of complex landscapes over large areas (regions to continents) such as required by SDG's and New Green Deal. These advancements represent a way ahead for challenges of connecting soil science and land management policy with operational reality, a well-recognized bottle-neck of land management policies implementation. This session aims to bring together current research integrating the fields of (i) soil spatial variation prediction (e.g. Digital Soil Mapping, Digital Soil Morphometrics) (ii) modelling soil functions and (iii) implementation of soil spatial knowledge & information into operational land management Decision Support Systems.

2. **Soil carbon: From particle to planet. Convenors: Boris Jansen; Ellen Kandeler; Curtis Monger; Pete Smith**

   Soil organic matter and soil carbon (both organic and inorganic) are keystone properties that influence multiple ecosystem services from climate regulation to food production. Looking at soil carbon through different lenses can reveal mechanisms operating at different scales that control carbon storage and sequestration in soils. At a micro scale we are unravelling the interactions between organo-mineral and biologically mediated processes that control the stability and persistence of organic carbon in soils and biomineralization of inorganic carbon in soils. At local and regional scale these processes are affected by land management practices, including enhanced weathering, and active geomorphic processes. At a global scale the associated interrelations and feedbacks of individual processes vary across different climate zones and soil geographies. This session crosses scales to link biogeochemical processes, land management and global soil geography within a socio-economic context to identify how to achieve effective soil carbon storage and climate change mitigation potential.

3. **Interdisciplinary soil science for impact. Convenors: Leo Condron; Phil Haygarth; Thomas Scholten**

   Soil scientists often cross boundaries between biology, chemistry, pedology, and physics as an integral component of their research, but truly novel and impactful research may benefit from broader collaboration outside soil science. For example, soil science contributes significantly to ongoing globally important research on climate change, economic development, resource availability and human impacts, which in turn has helped guide policy development. This inter-divisional session will showcase the spectrum of interdisciplinary soil science that has produced major impacts.

4. **Plant soil interactions and their roles in soil formation and sustainable crop production. Convenors: Ciro Rossolem; Peter Gregory**

A recent surge of research on root-soil interactions has shown how plants can shape biological, chemical and physical properties of soils, with a potential to ameliorate soil degradation and increase carbon sequestration. It has also been shown that root trait responses are highly soil specific, showing the importance of soil science in the search for plants suitable for particular environments and more sustainable crops. This session will explore root traits that can improve soils, for applications in ecological restoration, crop breeding and agricultural rotations.

5. **Soil Science and the emerging philosophy of regenerative agriculture. Convenors: Leo Condron; Christine Watson; Martin Blackwell**

Alternative approaches to agriculture that are focused on making significant contributions to the Sustainable Development Goals are appearing across the globe. Amongst these, the principle of 'regenerative agriculture' is an emerging approach to nutrient sensitive food production that sustains the health of the ecosystem. The novel management options adopted by regenerative agriculture report impacts on improved biomass production and soil health, and better water management through increased soil carbon. This session will discuss: the concept; observed effects on the soil; possible impacts on supporting ecosystem health when regenerative agriculture is implemented; the effects on soil functions. This provides an opportunity to investigate the many intersections with soil science and the crucial role it has to play.

6. **Dynamics of soil erosion and land loss under past, present and future environments. Convenors: Artemi Cerdà; Maria Bronnikova**

Accelerated soil erosion rates threaten the sustainability of human society. Agriculture, mining, overgrazing, road and railway embankments, forest fires, and timber production cause soil degradation and lead to high soil erosion rates. Climate change reinforces land degradation processes that have affected the Earth System since humans domesticated plants and animals. The Agricultural Revolution accelerated soil degradation rates and it is urgent that we shift towards agriculture, forestry, mining and infrastructure development that will bring sustainable soil management with soil erosion rates below the soil formation rate. This will allow us to achieve the Sustainable Development Goals of the United Nations, where soil is a key component. This interdivisional session is welcoming laboratory and field experiment, modelling and historical approaches that evaluate sustainable management practices leading to a reduction in soil erosion rates. Biophysical, societal, economical and perception approaches to soil management on agriculture and forest ecosystems are welcome.

7. **Soil securing humanity | Humanity securing soil. Convenors: Damien Field; Alex McBratney**

Soil security is the ability for soil to sustain multiple functions to provide planetary services and human wellbeing. This multidisciplinary concept is focused on securing soil's ability to provide a range of functions that sustain humanity and planetary system functioning through natural, economic, social and political science. Focused on assessing the soil's capability and condition, soil security is serviced by ensuring that the production, natural and conservation capital are evaluated. Supported by increasing soil awareness, education, and adoption of its social license increasing its connectivity with humanity, and where these dimensions are challenged codification of soil governance, policy, regulation and laws are equally essential. The community working on soil security is growing fast and the latest development and future existential challenges will be explored. Through humanity securing soil, this will secure the future of humanity.

8. **Sustainable land use. Convenors: Bob Rees; Claudio Zaccone; Sonoko Bellingrath-Kimura**

Climate change and threats to global biodiversity are two of the biggest environmental threats facing humanity in the 21st century and beyond. However, soil science can offer solutions to these interlinked challenges. Both climate change and biodiversity loss will place more pressure on land, including in sensitive ecosystems not previously used for food production, to provide provisioning services such as food and fibre production, but also other ecosystem services such as regulatory, cultural and supporting services. An improved understanding of the role of soils in helping deliver these services and the trade-offs that occur as a consequence of land use change will be critical to developing more sustainable land use policies. This session welcomes contributions that provide regional and global analyses of the importance of soils to sustainable land use.

9. **Novel methods and techniques. Convenors: Steve Hillier; Qjaoyun Huang; Alfred Hartemink**

Soil science has advanced considerably due to the availability of new techniques ranging from microscale measurements to modelling of soil interaction with the global environment. This session showcases emerging methods and techniques, highlighting their application in cutting edge interdisciplinary soil science.

10. **Land contamination and degradation, including urban land. Convenor: Thomas Aspray**

Humans continue to contaminate and degrade the value of land causing adverse effects on life and wider environments. Understanding the impacts of continued contamination and degradation on long term functioning of ecosystems and sustainable approaches to reverse damage are critical.

Scientific Sessions

11 Soil genesis

Commission 1.3. Convenors: Endre Dobos; Megan Balks

An understanding of soil genesis is critical for appreciating soil variability and soil distribution within a landscape, as well as soil resilience, and recovery from disturbance. Soil genesis encompasses soil processes, from initiation of the first stages of soil development in newly exposed, or newly deposited, parent materials through to the processes operating in highly weathered soils. A better understanding of such processes is critical to underpinning sustainable soil management.

12 Soil classification and palaeopedology

Commission 1.4, Commission 1.6.
Convenors: Curtis Monger; Maria Bronnikova; Bipin B Mishra; Elizabeth Solleiro-Rebolledo

This session welcomes papers on all aspects of soil classification and palaeopedology. For classification, we invite papers ranging from local applications of WRB and other classification systems to broadscale issues, such as using classification to understand global pedodiversity, biodiversity, and food security. For palaeopedology, we invite papers from local case studies of soil-sedimentary sequences with special attention to micromorphology to global reconstruction of paleoenvironments and understanding paleo-societies. The correlation of palaeosol records with other paleoenvironmental archives is especially welcome. We also invite papers linking classification with palaeopedology, such as the use of classification to understand the coevolution of soils and life as recorded in palaeosols.

13 How Pedometrics can cross boundaries and change society

Commission 1.5. Convenors: Titia Mulder; Nicolas Saby

In this session we welcome abstracts focussing on the following topics in Pedometrics.

1) Pedometrics & Handling Uncertainty, with research on predictive uncertainty, verification and decision making.

2) Pedometrics & Society, with research on using soil information and knowledge for society.

3) Advances in Pedometrics, research topics may include the understanding of soils and soil genesis by using data-driven algorithms and earth observation data, among others.

14 Soil geography: basic science and new technologies

Commission 1.2. Convenors: Thomas Scholten; Sergey Goryachkin

Soil geography is a traditional branch of pedology and now it brings together specialists in basic and target-oriented sciences. Modern soil geography increasingly implements not only theoretical frameworks and models but also up-to-date non-invasive and high-accuracy methods from local to pedosphere level including spectroscopy, UAV and satellite images. The session will focus on basic science and new technologies on different scales, from soil formation processes to environmental factors and ecosystems

15 Soil structure - Observation, resilience and its role in ecosystem functioning.

Commission 1.1, Commission 2.1

Convenors: Stephan Peth; Richard Heck; Fabio Terribile

How does soil structure influence key properties and where are its critical limits? How does it interact with biology and how important is it for soil ecosystem resilience? New approaches that cross disciplines and span scales will be described.

16 Nitrogen Cycling and Soil Health

Division 2. Convenors: Ryusuke Hatano; Liz Baggs

Excessive nitrogen use beyond the limits of the Earth's nitrogen cycle impairs soil health, resulting in increased N_2O emissions, NH_3 volatilization and NO_3 leaching. Optimal nitrogen management in sustainable food production will be discussed.

17 Sustainable Use of Legacy Soil Phosphorus

Division 2. Convenors: Leo Condron; Tandra Fraser

In most agroecosystems up to half of the phosphorus applied in mineral fertilizers and manures to maintain production is retained in the soil as inorganic and organic phosphorus. This has led to the accumulation of significant quantities of “legacy” phosphorus in these soils, especially in intensively managed systems. Increasing the mobilization and utilization of legacy soil phosphorus has the potential to reduce phosphorus input requirements and enhance overall phosphorus-use efficiency.

18 Biogeochemical cycles in the soil - processes linking the abiotic and biotic realms

Commission 2.2.

Convenors: Boris Jansen; Karen Vancampenhout

Soils recycle all major elements that our ecosystems need. This session explores how chemical, physical and biological controls of those elemental cycles are connected, with a focus on soil carbon.

19 Soil microorganisms under changing environment

Commission 2.3

Convenors: Ellen Kandeler; Magdalena Frąc; Richard Bardgett

This session explores soil microbes in different soil ecosystems, including the potential of soil microorganisms to drive processes that help in mitigating the environmental change consequences.

20 Soil biology in transition: from descriptive to mechanistical understanding

Commission 2.3

Convenors: Ellen Kandeler; Magdalena Frąc; Penny Hirsch

This session will improve our understanding of functioning and distribution of soil microorganisms in their natural habitat. Interdisciplinary studies at scales from millimeter to kilometer are very welcome.

21 Soil water, pollutant and gas movement in the context of a changing climate

Commission 3.2

Convenors: Lillian Øygarden ; Nobuo Toride

This session will explore new strategies for best management practices that can reduce environmental impact both on runoff and water pollution and for reduced greenhouse gas emissions.

22 Soil evaluation and land use planning

Commission 2.2

Convenors: Ivan I. Vasenev; Jagdish Prasad

This Session will address issues relating to soil evaluation in different climate zones in the context of needs of land use planning and regionally different regulatory frameworks.

23 Effects and processes of biochar and soil organic matter on plant nutrition

Commission 3.3

Convenors: Bruno Glaser; Toru Fujiwara

Plant nutrition depends on soil organic matter with different stabilities and can be enhanced through the addition to soils of biochar and biochar-mineral mixtures that also enhance soil carbon.

24 History, philosophy and sociology of soil science

Commission 4.5. Convenors: Eric Brevik; Lorna Dawson

This session covers key aspects of the links between, and role of, philosophy, history, geography, politics, sociology, economics, law, religion, diversity, and ethics in soil science, and how they impact Society at local, regional and global levels. We welcome papers that address inter- and transdisciplinary approaches.

25 Soil education – in School, university and In-Service training

Commission 4.4. Convenors: Cristine Muggler; Damien Field

Communicating and sensitizing the community on the role soil plays in securing human and global health relies on formal and informal educational efforts at different levels. This session welcomes papers that reporting these efforts in soil education.

26 How to move towards gender equality?

Commission 4.4 Convenors: Laura Bertha Reyes Sánchez; Eric Brevik; Lorna Dawson

Gender perspectives and attention to the goal of gender equality are central to all activities - policy development, research, promotion of dialogue, legislation, resource allocation, and planning, implementation, and monitoring of programs and projects (UN, 2001). The International Union of Soil Sciences understands that diversity, equity, and inclusion (DEI) are essential to provide a wide range of perspectives in all fields, including soil science. That is why the IUSS is committed to close the gender gap, working in collaboration with the Standing Committee for Gender Equality in Science (SCGES). To achieve that, soil science societies must ensure that women are consulted and contribute both to decisions about their strategic plans and the development of all their activities. Women must also promote their participation in decision-making and planning processes in their social environments, universities, and professional fields, as well as within their scientific societies. This session invites contributions with ideas and proposals to build a more inclusive, diverse, and equal IUSS.

Working Groups

27 WG1.1 **Progress in understanding cryogenic soils at the ends of the Earth: mountainous, polar and periglacial regions.**

Convenor: Alexey Lupachev

Soils in areas subject to freezing conditions, whether in the Arctic, Antarctic or high mountain areas, are of particular concern and interest as they respond and adapt to changing environmental conditions as a result of both climate change and direct human activities.

28 WG1.2 **Digital Soil Mapping : advances towards Digital Soil Assessment**

Convenors: Laura Poggio; Alessandro Samuel-Rosa

This session focuses on methodological and applied aspects of DSM, including the link with digital soil assessment on how the products of DSM can be integrated with other environmental models to map soil functions for sustainable management.

29 WG1.3 **Progress in Digital Soil Morphometrics- deeper and more precise soil observations.**

Convenors: Alfred Hartemink; Jingyi Huang; Richard Heck

Soil profiles as a unit for understanding soil receive increased research attention. This is driven by a whole range of new instruments and techniques to observe and describe soil profiles and by the need to study soil at greater depth. The new techniques include a range of proximal soil sensors, cameras, and the transfer and inclusion of laboratory instruments into field observations. It has resulted in more accurate soil horizon identification and delineation and more rapid and accurate assessment of basic soil profile observations. The need for studies at greater depth has been recognized in pedology, and vadose and critical zone studies. This session brings together a series of novel studies on soil profiles, how we observe them, what we learn from it, and suggests some future ideas for understanding soils.

30 WG1.4 **Global Soil Map, main advances and ways forward.**

Convenors: Dominique Arrouays; Pierre Roudier

This session will discuss recent developments and applications of digital soil mapping to populate soil information grids at the national and global scales, including the methodological challenges and implementation strategies used to accelerate and facilitate the use of these products.

31 WG1.5 Sensing soil chemical, physical and biological properties - advances and emerging techniques.

Convenors: Craig Lobsey; Asim Biswas

Soil sensors are a key source of efficient and cost-effective soil information. This session will explore emerging sensor technologies and techniques, including sensor data fusion and analytics, that improve our understanding and monitoring of soil chemical, physical and biological processes.

32 WG1.6 Soil information standards and systems - current initiatives and advances.

Convenors: Fenny van Egmond; David Medyckyj-Scott

There is a growing interest in (inter)national soil information systems (SIS) to expose and exchange standardised soil information as a basis for soil research, policy and decision making. This session has the following objectives.

- Presentation of ideas, issues, and experiences on the design, management and use of SIS.
- Discuss emerging (data) standards and technologies and their future applications to SIS evolution.
- Suggest ways to improve the soil data workflow from data collection to linking standardised provisioned soil data with other data systems.
- Discuss social and legal issues related to sharing soil information through SIS like governance, security, data privacy and (indigenous) data sovereignty.
- Present use cases of demonstrated benefits of SIS for users.

33 WG1.7 Advances in soil monitoring.

Convenor: Thomas Bishop

This session covers latest advances in approaches to monitor soil such as statistical and/or mechanistic approaches. In addition, applied studies over large spatial domains or long time periods will be presented.

34 WG1.8 Advances in Universal Soil Classification.

Convenors: Budiman Minasny; Jingyi Huang

The Universal Soil Classification system offers a way to standardise soil taxa of different classification systems based on numerical principles and taxonomic distance. This session discusses the progress in the numerical classification system comparing classes from countries around the world

35 WG1.9 Advances in understanding soils as reflected by the 4th edition of the WRB.

Convenors: Peter Schad; Stephan Mantel; Cezary Kabala; Cornie van Huyssteen

A soil classification system condenses our knowledge of a soil into a name. This name must inform about soil characteristics, genesis and functions. The information must be comprehensive and at the same time structured to allow a generalisation as in smaller-scale maps. A taxon must comprise soils naturally belonging together. The criteria for the decision to which taxon a soil belongs must be precise and easy to handle. They must guarantee that just those soils are allocated to the taxon that should be allocated there.

The first edition of the international soil classification system World Reference Base for Soil Resources (WRB) was published in 1998. Every eight years, a new edition was issued. While the revision of 2014 included a reworking of the architecture of the system, the revision of 2022 will concentrate on refining diagnostic criteria. These refined criteria reflect our better understanding of soil formation and soil dynamics and how soils are related to each other. They help better separate different soils into the different taxa. This includes new diagnostics and qualifiers defining soil characteristics that had not been considered so far.

This symposium welcomes contributions explaining the changes in the WRB and the progress in soil classification in general.

36 WG2.1 The Legacy of Henry Lin and the future of Hydropedology.

Convenors: Hans-Jörg Vogel; Johan van Tol

With climate change, the research field of hydropedology is gaining new momentum. We discuss future avenues of soil hydrology from the soil profile to landscapes while considering pedological features.

37 WG2.2 Modelling soil processes from ped to global scale.

Convenors: Roland Baatz; Martine van der Ploeg

Modelling soil processes aims to advance prediction capabilities across a range of soil related processes including biogeochemical cycles, hydrologic cycle, erosion, solute transport, catchment response functions, land-atmosphere interaction and land-climate feedbacks.

38 WG3.1 Acid sulfate soils, sulfidic materials and wetland soils.

Convenors: Anton Boman; Vanessa Wong

Acid sulfate soils are found around the world in both coastal and freshwater environments. These soils are dominated by metal sulfides, which, when exposed to oxygen, oxidise and result in acidification of soil and water. Acidification causes detrimental impacts to agricultural land, natural and managed ecosystems and infrastructure in urban environments. We invite submissions on all aspects of acid sulfate soils, sulfidic materials, and wetland soils in natural, managed and anthropogenic ecosystems.

39 WG3.1 **General Meeting of the acid sulfate soils working group.**
Convenors: Anton Boman; Vanessa Wong

Research on the sustainable use and management of acid sulfate soils are welcome to contribute to this session.

40 WG3.2 **Carbon and nutrient cycles under intensifying climate change and land management**
Convenors: Zhihong Xu; Chris Johnson

Carbon and other nutrient cycles are tightly linked. However, as the carbon cycle changes as a consequence of climate change and land use change, we expect to see linked changes to the cycling of other nutrients. Recent research exploring these relationships will be the focus of this session.

41 WG3.2 **Advances in innovative technologies and methods for quantifying biogeochemical cycles of carbon and nutrients in forest soils.**
Convenors: Zhihong Xu; Chris Johnson

Forest soils represent a major global reservoir of carbon and nutrients. Similarly, plants and soil processes move great quantities of carbon and nutrients through forest ecosystems. This session will highlight novel technologies and methods that may be used to study key aspects of carbon and nutrient cycles in forest soils and ecosystems. These include analytical, spectroscopic, and modelling techniques; novel observational approaches via field sampling, digital soil mapping and remote sensing; and new data-analytic and modelling approaches.

42 WG3.3 **SUITMA: Soils of Urban, Industrial, Traffic, Mining and Military Areas.**
Convenors: Kye-Hoon John; Przemyslaw Charzynski

Urban industrial and mined soils face very specific management challenges. This session welcomes contributions that improve our understanding of the management of these soil environments.

43 WG3.4 **Recent advances in nutritional, biological and physical processes in paddy soils.**
Convenors: Mizuhiki Nishida; Bentio Heru Purwanto

Rice is the world's second most important food crop, but new approaches to soil management are required in order to achieve sustainable future production. This session welcomes papers that provide new approaches to the management of fertility, physical and biological properties in paddy soils.

44 WG3.4 Mitigation and adaptation strategies for climate change in rice-based systems.

Convenors: Mizuhiki Nishida; Bentio Heru Purwanto

The sustainable production of the world's rice crops is under threat from climate change. Given that rice production is both a source of greenhouse gases, but also threatened by the consequences of climate change, new approaches to mitigation and adaptation are required.

45 WG4.1 The application of Soil Science in the Criminal Justice System.

Convenors: Lorna Dawson; Rob Fitzpatrick

Forensic Soil Science is important in delivering a safer criminal justice system. It assists police in narrowing down areas to search and also provides trace evidence analysis and evaluation in court. It is an interdisciplinary subject, and is applied in areas of serious crime, food provenance, fraud, environment, wildlife crime, international security and much more. Contributions from across the wide range of applications from across the globe are welcomed.

46 WG4.2 Culture and Soil. Outlook and insights from around the world.

Convenors: Nikola Patzel; Sabine Grunwald

The Cultural Understanding of Soils across the world is an important issue and a recent publication outlines this diversity. This session will discuss the future outlook and insights from this seminal text, whilst welcoming other contributions to this topic.