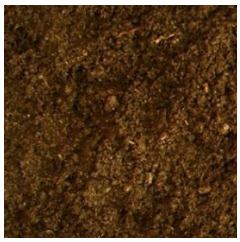
IUSS Bulletin 140

International Union of Soil Sciences (IUSS)

Bulletin 140

June 2022



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International Decade of Soils 2015-2024

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The IUSS Bulletin is the official Newsletter of the International Union of Soil Sciences.
It is freely distributed through the IUSS website.

Contents

IUSS Reports

IUSS Events

World Congress of Soil Science 2022 (WCSS22)

WCSS 2022 Scientific Programme available
We are pleased to inform that the full Scientific Programme of the WCSS 2022 is available.
Read more:
https://22wcss.org/programme/scientific-programme/.

WCSS 2022 Policy Programme 2 August 2022
Join policymakers from the UK and internationally on Tuesday 2 August to discuss Sustainable natural systems and effective global policies: how to protect a resource that supports life on earth. The full-day event will include Jack Hannam, Carmen Sanchez-Garcia and Erik Button from the Welsh Government Soil Policy Team, Cranfield University, Swansea University & Bangor University.
The event is free of charge for registered delegates.
Read more:
https://22wcss.org/programme/policy-programme/.
Follow us on Twitter: @Soil_Science and @WorldSoils2022.

Contact: *Bruce.lascelles@arcadis.com*.
Read more: *https://www.soils.org.uk/wcss2022*.

Activities of the IUSS President

Written by Lukasz Uzarowicz: lukasz_uzarowicz@sggw.edu.pl

On May 27, 2022, prof. Laura Bertha Reyes Sánchez visited the Institute of Agriculture at the Warsaw University of Life Sciences – SGGW, Poland. She met the employees of the Department of Soil Science. At the meeting, issues related to the further directions of the development of soil sciences, as well as soil science education of the society, in particular of young people, were discussed.

From the left: Artur Pędziwiatr, Edyta Pawłowicz, Lidia Oktaba, Piotr Jankowski, Beata Rustowska, Laura Bertha Reyes Sanchez, Józef Chojnicki, Łukasz Uzarowicz (© L. Uzarowicz)

Report from the IUSS Secretariat

IUSS on Twitter

By the end of June 2022, the number of followers on twitter had risen to more than 2700. Follow us at **@IUSS_ORG**, where we promote all our official activities and remain in touch with the Soil Science Scientists community worldwide. There are weekly tweets, with close to 2300 followers.

IUSS YouTube channel

The International Union of Soils Sciences has a YouTube channel: *https://www.youtube.com/channel/UCX3cdAuO5QrPx0EtDPahQcg*. It offers information on the WCSS22 in Glasgow, and the tours and arts programme, and a video celebrating IUSS' 97th anniversary, counting down the days until the centennial celebrations on May 19th 2024. It contains the video messages of the candidates for the presidential elections, and a selection of Linked videos, which are shared by the Secretariat. The channel currently has some 190 followers.

IUSS members are invited to provide links of their YouTube videos on soil science, which IUSS offers to share on its YouTube channel in order to make them known more widely. Videos should preferably be in English, but all languages are welcome. YouTube videos should not be larger than 2 GB, nor longer than 10 minutes. Please bear in mind to check pertaining copyrights. IUSS will not consider videos with unsuitable content. The Secretariat validates the videos and puts them online.

IUSS on Facebook

In the October 2021 Alert the Secretariat (iuss@umweltbundesamt.at) invited all IUSS members to submit contributions to the IUSS Facebook page, which has 14,600 followers (June 2022).

IUSS on LinkedIn

IUSS is also represented on LinkedIn in the Group 'IUSS – International Union of Soil Sciences', which is managed mainly by Niels Batjes, ISRIC – World Soil Information. Currently the group has already more than 4,500 members. You are kindly invited to join the group and post information for the IUSS members *here*.

IUSS Stimulus Fund

The IUSS Stimulus Fund was created to support suitable activities within the Commissions and Working Groups. Where appropriate, the Fund will also support other activities to assist the development of Soil Science in general, but particularly in regions of the world where lack of resources limit opportunities.

Some funds have been and will continue to be allocated to undertake specific projects identified by the Executive Committee, particularly projects which contribute to fulfilling the objectives of the International Decade of Soils. IUSS has set aside a sum of $15,000 annually to help fund a number of activities, but this funding may be increased, if the quality of applications is particularly high. The normal maximum award will be $2,500, but larger awards may be considered. For more information about the stimulus fund, please go to *https://www.iuss.org/...stimulus+fund*. Please note that research projects, travel costs of individual people, and applications from countries with outstanding membership fees as well as applications lacking detailed budgets cannot be taken into consideration for funding. As in the preceding years, in 2022 again USD 15,000 will be made available, with two submission dates for applications: 15 March and 15 September. Applications are always welcome and should be sent in due time to *iuss@umweltbundesamt.at*.

Calls for submissions are published in the IUSS Alert. Following the evaluation of the applications received for the first round of submissions (deadline 15 March 2022) the IUSS approved to support the following two activities, for which funds totalling € 4,650 have been made available:

1. Soil Judging Competition at WCSS22 in Glasgow, 26-31 July 2022: supporting the preparation of course material and scientific material
2. 4th Conference on Ecology of Micro-organisms, Prague, 19-23 June 2022: waiving the registration fee for 4 PhD students selected primarily based on the quality of their contribution (abstract) and their achievements, considering the length of their scientific work (based on CV).

A short (500-1,000 words) report of the activity for which the funds were received, must be presented for inclusion in the IUSS Bulletin within two months of completion.

Next submission date for applications: 15 Sep. 2022.

News from national and regional Soil Science Societies

Soil Science Society of America

Soil Science Society of America Annual Meeting, Nov. 6-9 in Baltimore

Come join the American Society of Agronomy, the Crop Science Society of America, and the Soil Science Society of America in Baltimore, MD, Nov. 6-9, 2022, to help turn the strategies into actions and the actions into impacts. All scientific abstracts are accepted! Gain presentation experience and professional recognition among premier agronomic, crop, soil, and related science professionals. Your efforts will expand your CV/vita, disseminate information for all to succeed, and foster lasting collaborations with your peers.

In person and virtual abstract submission available. Submit an abstract by June 21 to save; final day to submit is July 12. Don't have the detail you need to submit an abstract? No problem! Abstracts at this point are simply "holding slots" that reserve your spot in the desired session. Submit now and update through Nov. 9. Need tips on how to write an abstract?

Check out *www.acsmeetings.org/submit* for tips, regulations, and FAQ.

We invite you to join us in Baltimore and/or virtually: *https://www.acsmeetings.org/*.

British Society of Soil Science

EJSS Special Virtual Issue: STARS

Following on from the Zoom into Soil webinar held in June 2021, we are delighted to announce that a special open-access virtual issue has been published in the European Journal of Soil Science. STARS: Innovations in Soil Science to Address Global Grand Challenges presents a collection of papers to celebrate the UK Centre for Doctoral Training (CDT) in soil science known as STARS. The issue highlights the work of emerging UK soil scientists. Read more:

https://onlinelibrary.wiley.com/journal/13652389.

Outreach: School Soil Workshops

Can you help? *Soil Voices*, an outreach programme funded by the *International Union of Soil Sciences*, is seeking international schools to participate in workshops aimed at bringing soil education to the classroom. For more information, please get in touch via *ourlivingsoil@soils.org.uk*.

[All four articles above are from Digging Deeper with BSSS: Issue 4, December 2021]

Webinar Zoom into Soil: Soils in Scotland

As we looked ahead to the World Congress of Soil Science 2022 in Glasgow Dr Allan Lilly, a Senior Soil Scientist at The James Hutton Institute, presented 'The Soils of Scotland: An Overview' in the webinar on February, 2, 2022. With this in mind, Allan provided an overview of Scottish soils, their diversity and some of the factors that contribute to the diverse range of soils found within the Scottish landscape.

Ben Butler, a Digital Soil Mineralogist at the James Hutton Institute, presented 'The Mineralogy of Scottish Soils'. The many properties and functions that soils provide for life on land are inherently linked to their mineralogy. Accurately identifying and quantifying soil mineral compositions therefore provides a wealth of information that can be used to better understand and manage soil systems amidst the great demands placed upon them. Scottish soils are particularly diverse in mineralogy due to the assortment of parent materials that feature across the nation, in combination with the variation in soil forming factors that act upon them. In his presentation, Ben introduced the minerals that can be found in Scottish soils, their approximate spatial variation, and how these minerals affect soil properties. He discussed some

ways in which soil mineral data can be collected and analysed quantitatively using open-source, computational approaches.
The recording of the event is available on the British Society of Soil Science (BSSS) YouTube channel: *https://youtu.be/DKmnjgWjSfg*.

Our **2021 Annual Report** is now available, setting out the significant achievements we have made over the past year. This includes organising 26.5 training hours for members, sending 27 email updates, responding to five consultations and representing members as a Non-Governmental Organisation at COP 26. The Annual Report demonstrates the impact which our activities are having and the progress we are making against our *strategic goals*.
Read more: *https://soils.org.uk/wp-content/uploads/2022/04/Final-Annual-Report-2021.pdf*.

Our **Science Note: Soil Carbon** is featured in the Spring edition of Science in Parliament. The article, Is Sequestering Carbon in Agricultural Soils A Viable Option for Climate Change Mitigation?, outlines some key messages and recommendations to policy makers.
Read more: *https://soils.org.uk/wp-content/uploads/2022/04/email-sip-SPRING-2022.pdf*.
The British Society will be providing a £5,000 Interdisciplinary Grant which will be awarded to a group of Early Career professionals during the World Congress of Soil Science 2022 in Glasgow. To apply for the grant, at least one member will need to attend the workshop we are hosting on 20 July.
We will be offering a grant of £5,000 to a team of early career professionals attending WCSS22. A workshop was held on Wednesday 20 July from 10.30am to 1.00pm (British Summer Time) to provide an overview of the grant, guidance on how to write a successful funding bid and an opportunity to network with your peers to create your multi-disciplinary team. This workshop is a prerequisite to applying for the grant and attendees must book their place in advance.
Read more: *https://soils.org.uk/news/5000-early-career-interdisciplinary-grant/*.

Soil Science Society of China

Newsletter of the Soil Science Society of China

In order to promote and strengthen the communications and exchanges between soil scientists in China and the rest of the international soil science community, the Soil Science Society of China (SSSC) has launched its first Newsletter on the 8th World Soil Day. It is a window for Chinese soil scientists to present the latest content concerning progress and achievements and also a link to connect with global soil researchers, to take an active role in preparation for the 23rd WCSS to be held in China in 2026.
The SSSC Newsletter will be published every two months.
The most recent newsletter of the Soil Science Society of China – Vol.3 is available online. Starting out with policy highlights it features news on the Dan Yaloon and IUSS Von Liebig awardees, information on new research and recent publications.
Read more: *https://www.iuss.org/newsroom/newsletters/soil-science-society-of-china-sssc-newsletter/*.

German Soil Science Society

Pelosol – Soil of the Year 2022

Since 2005, the "Soil of the Year" has been selected and presented by a Board consisting of the German Soil Science Society (DBG), the Bundesverband Boden (BVB) and the *Ingenieurtechnischer Verband für Altlastenmanagement und Flächenrecycling* (ITVA) under the joint umbrella of the "Platform for Action Soil Protection – ABo". Supported by the German Environment Agency (Umweltbundesamt – UBA) at Dessau, the action intends to raise awareness of soils and their functions and ecosystem services. The aim is to capture the interest of as many people as possible in order to foster the responsible handling, and thereby the protection of, this vital resource.
The "Soil of the Year 2022" was chosen as the "Pelosol", hosted by the Federal State of Baden-Württemberg.
It was officially presented to the public on December 3, 2021 at a conference in Berlin on the occasion of the World Soil Day.
Pelosols are soils with a high clay content that swell when moist and shrink during drying out. This alternation results in the formation of a soil structure with sharp-edged soil aggregates and deep-reaching cracks. Pelosols (from Greek pélos = clay) often cover clay- and marlstones

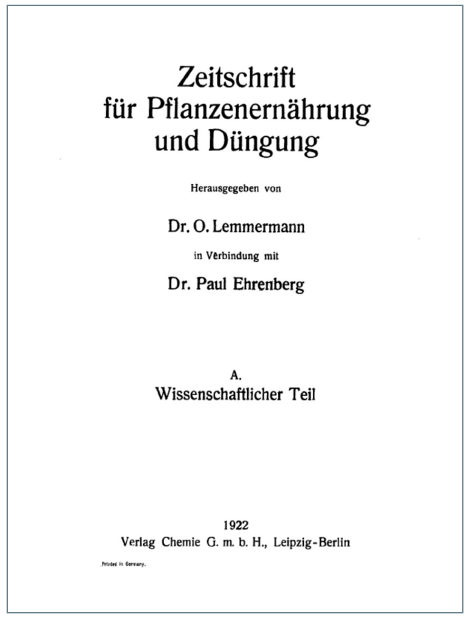
(© Kuratorium Boden des Jahres)

of the Mesozoic era of the escarpment landscapes of southern Germany. Their color varies according to the parent rock from grey to brown and red.
In German soil systematics, Pelosols form an own soil class, containing soils from clayey parent rock, or weathering into clayey materials. The soil type Pelosol is defined by a Ah – P – C horizon sequence, with a minimum thickness of the P horizon of 30 cm. In the World Reference Base for Soil Resources (WRB 2015), Pelosols are mainly assigned to the Vertic Luvisols, Vertic Cambisols, and Vertisols.
Read more: *https://www.dbges.de/en/system/files/Boden%20des%20Jahres/2022/soil_of_the_year_2022_130122_0.pdf*.
Read more: *https://www.dbges.de/de/boden-des-jahres* or *https://boden-des-jahres.de/*.

100 years of JPNSS – Membership journal of the German Soil Science Society and Cooperating Journal of the IUSS

In 2022, the "Journal of Plant Nutrition and Soil Science – JPNSS" celebrates its 100th anniversary. This occasion marks an outstanding tradition of academic publishing – from the early beginnings as a result of the conceptual partnership with the German Soil Science Society (DBG) that continues today, as well as with the German Society of Plant Nutrition (DGP) since 1975. Accordingly, JPNSS is the membership journal of the two affiliated societies and remains one of the few journals to retain the status of a "Cooperating Journal of the International Union of Soil Sciences (IUSS)". On the occasion of the journal's Centenary Year 2022, a selected number of invited papers authored by recognized scientists in their fields is published.
Founded in 1922, JPNSS is one of the, if not the oldest, journals still publishing in this field worldwide. Throughout all those years, there has been a continuous and successful partnership with the publisher "Verlag Chemie–VCH", founded in 1921 at Leipzig/Berlin, and today based in Weinheim an der Bergstraße, Germany. Since 1996, VCH is part of John Wiley & Sons (Hoboken, New Jersey, USA), which has opened up a whole new world of technical and distributional facilities for JPNSS. This covers the online submission and review of manuscripts, inclusion in all leading bibliographic systems, as well as quick and easy online access to all articles that have appeared since the early beginning of the journal.

At present, JPNSS is the journal with the longest tradition in the interaction of plant nutrition with soil science. Over the years, the name of the journal has been subject to various changes. This mirrors historical developments not only in its scientific focus but also in the readership as reflected in the publication language. The journal started as "Zeitschrift für Pflanzenernährung und Düngung" (Journal of Plant Nutrition and Fertilization) founded by Otto Lemmermann and Paul Ehrenberg, professors of agricultural chemistry and soil bacteriology in Berlin and Breslau (today Wrocław, Poland), respectively.
After the foundation of the DBG in 1926, the journal became the society's editorial organ and from 1927 onwards appeared under the title "Zeitschrift für Pflanzenernährung, Düngung, Bodenkunde" (Journal of Plant Nutrition, Fertilization, Soil Science). Initially, there were two separate editions: In Part A, edited scientific papers in the fields of agricultural chemistry, plant nutrition and soil science were published. Part B was dealing with agronomic and practical aspects, that is, relating to recommendations to correct fertilization of soils in order to increase crop production. Following National Socialist "alignment" (Gleichschaltung) policies at that time the two parts were merged in 1935, and in 1936 the journal's name was shifted to "Bodenkunde und Pflanzenernährung" (Soil Science and Plant Nutrition). It was published by the "Reichsarbeitsgemeinschaft Landwirtschaftliche Chemie" and represented the joint organ of the DBG, "Forschungsdienst und Fachgruppe Landwirtschaftschemie im Verein Deutscher Chemiker" with Fritz Giesecke (Berlin) as editor. Soon after World War II, in 1946, the journal was published again under its former title and with Otto Lemmermann as editor. After his death in 1953, the number of editors increased reflecting the expansion of research fields and related themes. From 1967 onwards, it appeared under "Zeitschrift für Pflanzenernährung und Bodenkunde" (Journal of Plant Nutrition and Soil Science). It has kept this name up today only with a shift in language. Articles were first published in English in 1973 and since this time the percentage of papers submitted and published in this language has continuously increased. As a consequence, English as the globally accepted language of science officially replaced the publication practice of mixed German/English in 2008.
Since 1975, there have been two separate editorial offices for soil science and plant nutrition. In 2004, a group of associate editors was added to the structure. Since 2017, the number of associate editors has been continuously expanded to about 40 board members. Those structural changes had become necessary since the number of submissions has increased drastically. At the same time, JPNSS has become more international and its cross-border recognition has likewise increased considerably which is reflected in the steadily increasing impact factors. Today, the editorial team is clearly international, and the recent list of contributing reviewers covers more than 200 names of peers distributed all over the globe.
A recent and warmly welcomed innovation was to organize "Topical Issues" and "Focus Issues". Furthermore, new formats such as "Game Changer" (including the "Perspectives from the Fritz-Scheffer Awardees"), "View Points", "Opinion Papers" and "Liebig Reviews" were introduced to the journal. JPNSS is one of the first journals daring to offer "Registered Reports" as part of the "Open Science" agenda which allows scientists to publish follow-up results independent from their research outcome.
Since 2021, the journal also has a complete make-over and shines in a modern style, not only in the printed issues but also online. In the context of modernization, the proofing process was also updated and now runs completely digitally in a simple and uncomplicated manner. Open Access is becoming more and more important. At present, Hermann Jungkunst (Landau) and Karl H. Mühling (Kiel) are serving as Editors-in-Chief.
Read more: *https://onlinelibrary.wiley.com/doi/epdf/10.1002/jpln.202270016*.


Zeitschrift für Pflanzenernährung und Düngung

Herausgegeben von

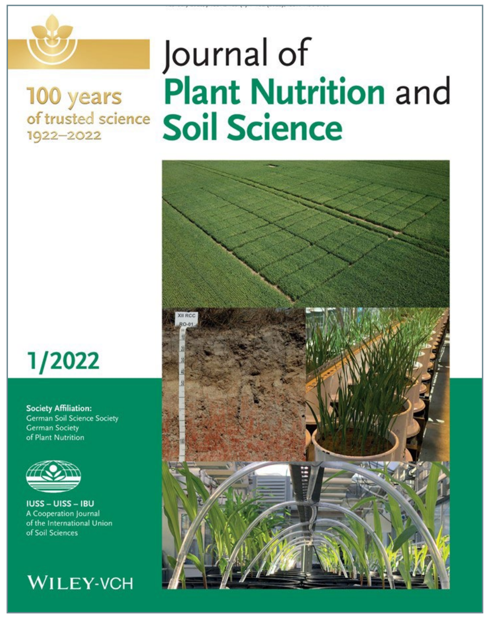
Dr. O. Lemmermann

in Verbindung mit

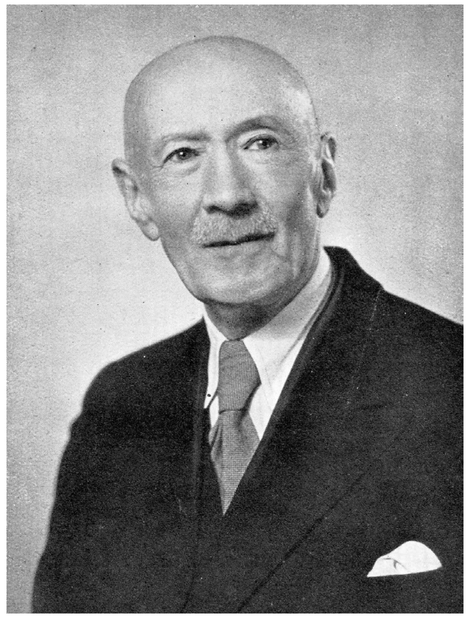
Dr. Paul Ehrenberg

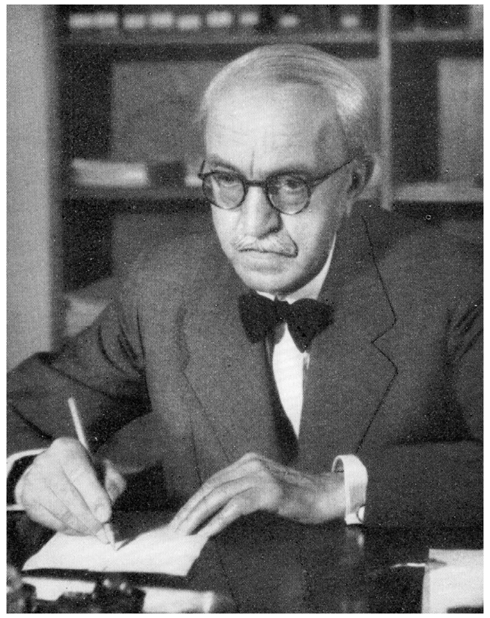
A.
Wissenschaftlicher Teil

1922
Verlag Chemie G. m. b. H., Leipzig-Berlin



Left:
Cover page of the first issue 1922.
Right:
Cover page of the anniversary issue 2022





Left:
Prof. Dr. Paul Ehrenberg (*1875 †1956), Founding Editor (Source: Maiwald, 1950).
Right:
Prof. Dr. Otto Lemmermann (*1869 †1953), Founding Editor (Source: Blanck et al., 1953)

Soil Science Society of Iran

Journal of Soil Science Society of Iran launched

The Iranian Soil Science Society (a member of IUSS) have just launched an international English language scientific journal (Journal of Soil Science Society of Iran, in short JSSSI). JSSSI will be published twice a year focusing on basic and applied research in soil biology and biotechnology, soil chemistry and fertility, soil physics and conservation, soil pedology and classification, and hydrology in agricultural, rangeland and pasture, desert, forest, wetlands, and urban settings.
Read more: *https://jsssi.iut.ac.ir*.

Malaysian Society of Soil Science

The Malaysian Society of Soil Science (MSSS) in collaboration with Institute of Biological Sciences (ISB), Universiti Malaya (UM) will organize the 15th International Conference of the East and Southeast Asia Federation of Soil Science Societies (ESAFS 2022) to be held in, Kuala Lumpur Malaysia on August 22-26, 2022. The theme of the conference is 'Our Soils Our Future'. Closing date for abstract submission: 28th April 2022 *esafs2022@gmail.com*.
Read more: *https://web.facebook.com/esafs2022*.

ESAFS Poster (© Malaysian Society of Soil Science)

Latin American Soil Science Society (SLCS)

Brazilian Soil Science Society

Brazil forms a national network of universities to offer postgraduate course in soils

The Brazilian government agency for promoting postgraduate education, CAPES, approved the formation of a consortium of universities to offer a postgraduate course in Geoprocessing, Soil Survey and Interpretation, to be offered remotely, starting on January 2023. The project of the course integrates the future proposal of the Pronasolos University and its general objective is to train public agents and professionals in soil characterization, survey and mapping and interpretation of this resource for agricultural and environmental purposes.

The professionals will work in various activities and institutions, especially in the National Program for the Survey and Interpretation of Soils in Brazil (PronaSolos), which has the objective of mapping Brazilian soils, at scales ranging from 1:25,000 to 1:100,000. The lack of detailed information on Brazilian soils is a serious problem for national development, since, currently, less than 5% of the national territory has soil maps at detailed scales of 1:100,000 or greater.

The project of the postgraduate course was planned to be the origin of a future Pronasolos University. It is a partnership of Brazilian Universities, including, initially, the UFRRJ, UFV, UFMG, UFRA and UFG, with the support of the Brazilian Soil Science Society (SBCS) and the Ministry of Agriculture and Livestock (MAPA).

By Léa Medeiros, Jornalista

Chilean Soil Science Society

General Soil Law approved unanimously in the Senate of the Republic of Chile

On January 12 of this year, after two years of work led by the Chilean Soil Science Society in conjunction with academics from Chilean universities, colleges of geographers and geologists and NGOs, the General Soil Law was approved unanimously in the Senate of the Republic of Chile.

IUSS congratulates the Chilean Soil Science Society for this great achievement.

Discussion of the General Soil Law at the Senate of the Republic of Chile (© Chilean Soil Science Society)

Mexican Soil Science Society

Knowing the Soil: Environmental Education Workshops of the Soil Science Education and Teaching Commission of the Mexican Society of Soil Science

In commemoration of the International Day of Forests and World Water Day, on March 21 and 22, 2022, respectively; the Commission for Education and Teaching of Soil Science of the Mexican Society of Soil Science, held a discussion in the municipality of Cuautinchán, Puebla, México on the importance of the WATER-SOIL-FORESTS relationship and an educational workshop on infiltration and retention of water pollutants in the soil. 55 preschool, primary and secondary school children participated, as well as 30 people from the communities of the municipality. The children made an exhibition of drawings on forests, water and its relationship with the ground.

Environmental Education Workshop on the importance of the soil in the retention of pollutants

Exhibition of preschool children

Exhibition of secondary school children

Conversation on the importance of water-soil-forest interaction (© all: Rosalía Castelán Vega)

Highlights from the National Soil Science Societies 2021/2022

In order to celebrate the 200th edition of the IUSS Alert we have asked the national soil science societies to share one main highlight from 2021 or 2022 with the international soil science community. Below you will find what is at the heart of national soil science activities.

Soil Science Society of America

In summer 2022, the Soil Science Society of America together with the American Society of Agronomy and Crop Science Society of America are launching a brand-new educational platform about carbon and ecosystem service markets. This science-based, impartial educational platform will provide producers, conservationists, certified crop advisers, and certified professional soil scientists with bite-sized, multimedia educational materials. By closing the knowledge gap with science-based insights, ASA, CSSA, and SSSA can help growers make better decisions and accelerate climate-smart agriculture. Keep your eyes peeled for the official launch in the summer of 2022!
Read more: *www.soils.org*.

Argentine Association of Soil Science

Since 1959, the most important work of the Association are the Argentine Congresses of Soil Science. This year (2022) the XXVIII Argentine Congress of Soil Science will be held in the Autonomous City of Buenos Aires in November, inviting distinguished colleagues to participate in it. Read more: *www.congreso2022.suelos.org.ar*.
In 1983 the Association has begun to publish the scientific magazine Ciencia del Suelo in Spanish, indexed, with free and open access (*http://www.suelos.org.ar/sitio/publicaciones/revista-ciencia-del-suelo/*).

The website created in 2002 provides up to date information on soils *www.suelos.org.ar* with presence in all social networks.
Since 2018 it has the digital magazine Nuestro Suelo. The objective is to disseminate knowledge generated in our country on the soil and conservation (*http://www.suelos.org.ar/sitio/publicaciones/revista-nuestro-suelo/*).

Austrian Soil Science Society

In addition to the yearly scientific congress and respective excursions, the ASSS hosts the Austrian Soil Forum twice a year, where soil experts from science and public administration discuss current problems and developments regarding soil protection and soil health. Furthermore, the ASSS organizes the soil film day to show and discuss current films regarding soil. As an inherent part of the yearly species protection days at Schönbrunn Zoo, the ASSS presents soil topics to the interested public. Similarly, the ASSS organizes soil workshops for pupils and students in schools.
Read more: *https://www.oebg.org/en/*.

Soil Science Society of China

The Soil Science Society of China (SSSC) signed a strategic cooperation framework with the Soil Science Society of America in 2021. The SSSC launches its first Newsletter (in English) on the 8th World Soil Day. It is a window for Chinese soil scientists to present the latest progress and a link to connect with global researchers.
In 2022, the 10th International Symposium on Forest Soils (ISFS 2022) will be held in October in Hangzhou, China.
Conference of the 20th Chinese young soil scientists and the 15th Chinese young plant nutrition and fertilizer scientists will be held in May in Yan'an, China.
Read more: *http://www.csss.org.cn/en/*.

Czech Society of Soil Science

The Czech Society of Soil Science currently has 138 members. In the years 2021-22, we focused on the publication of Soil – An Overlooked Treasure, which is intended for high school students and other interested parties, and was distributed in e-form with the help of the Ministry of Education. During the coronavirus pandemic, the regular conference was not held in 2021; we are now preparing a joint conference with Societas pedologica slovaca for 2022. We will also be co-organizers of the Central European ISTRO conference. Within cooperation with ministries and EU bodies, we have advised on materials in the field of soil protection.
Read more: *https://pedologie.czu.cz*.

The Finnish Society of Soil Sciences

The Finnish Society of Soil Sciences (FSSS) was established 1971 in Finland. From early on, the FSSS has participated actively in international networks, currently being affiliated to IUSS and ECSSS and involved in a national SoilHub of European Joint Programme project. The FSSS promotes global and national research in soil sciences, by organizing for example field excursions and public seminars.
Every second year, a two-day scientific seminar is organized, gathering soil scientists with industry, NGO´s, policy makers and students. Bringing together experts from geology, soil physics and chemistry, plant ecology and molecular microbiology is highly appreciated in the Finnish scientific community.
Last year our Society celebrated its 50th birthday, and the logo above is new and was published to highlight the birthday.
Read more: *https://www.maapera.fi*.

Association Française pour l'Étude du Sol – French Association for the Study of Soil

Highlights from 2021 and for 2022 include: Étude et Gestion des Sols (EGS): Peer reviewed open access scientific journal, 20 papers, including a special issue 'Soil biodiversity'; Webinars: 53 scientific conferences online (2021); PromoSolEduc: Promoting soil in education, initiated in 2020; Co-foundation with the SECS (Spain) of the Pyrenean Alliance of Soils (AsPyr), cross-border consortium (GSP's global alliances); 15th Journées d'Étude des Sols, June 21-25, the French congress; AFES invited presentation, Serbian congress of Soil Science, September 23; World Soil Day: Seminars and conferences, December 2-7 2021 (Toulouse 2022). Demolon: Travel grants call launched for 2022; Seven new webinars for 2022.
Read more: *https://www.afes.fr/*.

Hungarian Soil Science Society

Hungarian Soil Science Society

The Hungarian Soil Science Society is looking forward to get back to normal, preCOVID-19 activity soon. Our most important forum, the biennial *travelling* conference was basically virtual in 2020 in Sárvár, Western Hungary, but we look forward to a physical meeting this year in Hódmezővásárhely, Southern Hungary. We are currently busy with a soil science promotion project. Another great topic for 2022 is participation in the Glasgow Congress where we expect large Hungarian delegation. The national soil journal Agrokémia és Talajtan prepares an English language volume dedicated to the event and we support the preparation for the soil judging contest.
Read more: *http://talaj.hu/*.

Italian Soil Science Society

In 2022 the Italian Soil Science Society (ISSS) celebrates its 70th anniversary and organizes the 44th National Congress entitled "Soil in the Ecological Transition for Sustainable Development" in Rome 5-7 October 2022. Since ISSS is the organizer of the International Congress for the IUSS Centennial, this relevant event is being announced within the framework of international congresses and workshops on soil science such as the GLOSOLAN (FAO) network, the 22nd World Congress of Soil Science (Glasgow) and the EGU (Vienna). ISSS is active in promoting Soil Science awareness at all educational levels, starting from primary school.
Read more: *https://scienzadelsuolo.org/*.

Japanese Society of Soil Science and Plant Nutrition and Japanese Society of Pedology

In 2021 the Japanese Society of Soil Science and Plant Nutrition (JSSSPN) and the Japanese Society of Pedology (JSP) have jointly published "The Soils of Japan" as a part of the World Soils Book Series by Springer. 165 Japanese soil scientists contributed to the publication. We try to translate it to widely educate new Japanese generations. To look back the 10 years after the Fukushima Daiichi Nuclear Power Plant accident, JSSSPN opened a symposium for the reconstruction of agriculture at Fukushima. We will further internationalize through cooperation with IUSS and East and Southeast Asia Federation of Soil Science Societies (ESAFS).
Website JSSSPN: *http://jsspn.jp/Eng/index_eng.html*.
Website JSP: *http://pedology.jp/*.

Korean Society of Soil Science and Fertilizers

KSSSF will host the 8th International Symposium on Soil Organic Matter (SOM2022) on 26-30 June in Seoul, Korea. The theme of the conference – "Soil Organic Matter in the Anthropocene" focuses on novel applications of contemporary analytical, mathematical, and theoretical approaches to advance our understanding of SOM dynamics, storage and sequestration, whilst maintaining other critical ecosystem services including climate regulation and food security. For more information and online abstract submission, please visit our conference website at *https://www.som2022.org/*.
Read more: *https://ksssf.org*.

Norwegian Soil Science Society

The Norwegian Soil Science Society (*http://www.jordforeningen.no/*) launched a new initiative called 'Soil chats', a popular science video podcast where young soil scientists are interviewed and present their background and current work (in Norwegian only). Topics include soil health, biochar, fish sludge, and soil C. In connection with one of these, we also made a video recording of a PhD trial lecture (in English) featuring biochar specialist Adam O'Toole, presenting a 45 min talk on 'Management induced effects on soil health, with a focus on soil biota'. This is freely available at: *https://vimeo.com/663175427* and well worth watching. Enjoy!

Soil Science Society of Poland

The pandemic has changed the World and activity of research community. The activity of the Soil Science Society of Poland has switched from live and field meetings to on-line meetings. We participated and co-organized conferences such as: "Brunic Arenosols in Poland-genesis, properties, ecological and economic importance", "Soil Classification & Education", "Saline Soils in Poland-scientific, ecological, and functional importance", and "International Conference on Soil Science". The soil of the 2021 in Poland was Brunic Arenosol. The 2022 is dedicated to Alluvial soils. We are working on establishing an award for young researchers for the best thesis or article. Furthermore, the intensive work is underway for organization the 31st Congress of the Soil Science Society of Poland in 2023 ("Soil in a Changing World").
Read more: *http://ptg.sggw.pl/*.

Spanish Soil Science Society

This year the Spanish Soil Science Society (SECS) turns 75 and to commemorate this anniversary, more special activities and events will be organized. Among them, the inauguration of the Soil Science Documentation Center in Spain (Ce.SECS) in the University of Santiago de Compostela, the participation of a SECS team in the International Soil Judging Contest in Glasgow (UK) within the framework of the 22nd World Congress of Soil Science and the celebration of the IX Iberian Congress of Soil Science (CICS2022: *https://events.iniav.pt/cics2022*) in Lisbon (Portugal) co-organized with the Portuguese Society of Soil Science.
Read more: *https://www.secs.com.es/*.

Awards

IUSS Distinguished Service Medal 2021 to Dr. Taolin Zhang

By Laura Bertha Reyes Sánchez

Following its mission, since 2012 the IUSS has recognized outstanding world soil leaders who have translated soil science into action, by awarding the IUSS Distinguished Service Medal.
In this regard,
In recognition of his outstanding professional career both supporting the agriculture focused on the sustainable management of arable land use, particularly the Mollisols at Northeast China, leading the public policies necessary for their preservation, and organizing the third national-wide soil survey of China for the greening and sustainable development of agriculture of that country:

* *Dr. Taolin Zhang, Vice Minister of Agriculture and Rural Affairs of China will be bestowed with the* ***IUSS Distinguished Service Medal 2021***.

Recipients of the IUSS Dokuchaev, Von Liebig and Jeju Awards 2022

The IUSS is proud to announce the awardees of the prestigious IUSS Awards in 2022 and congratulates them on their great scientific achievements:

Professor Emeritus Nicola Senesi is the recipient of the 2022 **IUSS Dokuchaev Award** for his outstanding contributions and achievements in basic soil science research. Prof. Senesi's distinguished career spanned more than half a century (1967-2021) and focused on the instrumental role of soil systems for both agricultural production and environmental protection. He has widely and successfully applied several novel and advanced chemical, physico-chemical and biochemical methods and spectroscopic techniques to investigate the molecular structures and chemical functionalities soil organic matter, especially humic fractions isolated from a wide variety of soils, organic amendments and waters. He used the same approaches to study from a novel perspective the interactions of pesticides with and the complexation of micronutrient/micropollutant trace metals to humic substances. His innovative results highlighted specific molecular and reactivity aspects of humic substances by the application of fluorescence and electron spin/paramagnetic resonance spectroscopies. Prof. Senesi also pioneered studies on the fractal and nanoparticle nature of humic substances, which is bringing to a new vision of the versatility, behavior and functions of these substances in soil and water environments.
The intense and wide research activity and the scientific stature of Prof. Senesi is reflected in his impressive scientific publication record and citations including ranking in the top 1% of scientists in the Stanford University World Ranking of Scientists. Prof. Senesi was also a visionary educator by lecturing extensively and with great technical skill and unique social and human approach both in his home University in Bari and in academic and research institutions of several countries where he was visiting scholar. Upon nomination by the Academic Senate and the Rector the University of Bari, in 2015 he was conferred the prestigious title of "Professor Emeritus" by the Italian Ministry of University and Research.
Prof. Senesi served in multiple roles in national and international scientific organizations and in the organization of several international and national conferences and symposia. He was an active member in ISSS/IUSS, serving as Chair of Commission II-Soil Chemistry of ISSS and then as Chair of Division II-Soil Properties and Processes of IUSS.
Read more: *https://www.iuss.org/about-the-iuss/awards-prizes/dokuchaev-award/*.

Professor Yong-Guan Zhu is the recipient of the 2022 **IUSS Von Liebig Award** for his achievements in applied soil science research. Dr. Zhu has made outstanding contributions in the field of soil-plant-microbe interactions, particularly in relation to the biogeochemistry of metals (arsenic), emerging chemicals (antibiotics), and nutrients (nitrogen and phosphorus).
Dr. Zhu's research has led to detailed understanding of the effects of arsenic on the global food supply and was the first to characterize the risk of food arsenic to the health of the Chinese population. In addition to arsenic, he has made substantial contributions to the mitigation of risks associated with soil polluted with radionuclides, pioneered the characterization of the environmental antimicrobial resistome (AMR) and developed the field of coupled biogeochemical processes. One of his most enduring contributions is his leadership in promoting multidisciplinary study in applied soil science in China. He is among the first in China in combining modern physical, chemical, and biological tools to study soil-plant-microbe interactions, such as synchrotron radiation-based spectroscopic techniques and molecular biological tools.
Dr. Zhu has been instrumental in promoting international collaboration between China and the rest of the world, such as Australia, Japan, USA and the United Kingdom. At the Chinese Academy of Sciences (CAS), he is a leader in expanding environmental soil science and integrating it into CAS's key comprehensive research programs.
Dr. Zhu was one of the founding Directors of the Institute of Urban Environment (IUE) of the CAS and has served as the Director General of the IUE for nearly ten years.
Dr. Zhu has also provided leadership to his profession by serving as Vice President of the Chinese Society of Soil Science, Chinese Ecological Society, and the International Society of Trace Element Biogeochemistry; Vice Division Chair of the International Union of Soil Sciences (IUSS) and Vice President of the International Union of Radioecology.
Read more: *https://www.iuss.org/about-the-iuss/awards-prizes/von-liebig-award/*.

Dr. Umakant Mishra of the Sandia National Laboratories is the recipient of the 2022 **IUSS Jeju Award** for his outstanding accomplishments as an early-career soil scientist. Dr. Mishra's research on terrestrial carbon cycle science has received both national and international recognition. His research has compared the ability of classical spatial statistical analysis with machine learning. He showed that the soil organic carbon prediction accuracy was improved by combining the results from the machine learning analysis approaches. Dr. Mishra has also conducted research on land use change, life cycle analysis, and greenhouse gas emissions in many environments.
Through his research efforts he has established productive research collaborations with four U.S. Department of Energy national laboratories, several U.S. universities, and faculty members from Brazil, China, Germany, India, Sri Lanka, South Korea, and Sweden. These research collaborations have resulted in Dr. Mishra conducting research in many countries and climates including tropical, subtropical, temperate, and permafrost affected soils.
In his professional career, Dr. Mishra provided leadership to different committees of various scientific societies/agencies in the U.S. and globally. Dr. Mishra also serves frequently to research proposal review panels of various agencies. Scientific contributions of Dr. Mishra received an outstanding associate editor award from the Agronomy Journal in 2014 and the distinguished research award from the Regional and Global Modeling program of U.S. Department of Energy in 2020.
Dr. Mishra's interdisciplinary research experience, collaborative initiatives with national and international investigators, track record of generating funding, contributions to the scientific literature, and service to scientific societies make him a most deserving recipient of the IUSS Jeju Award.
Read more: *https://www.iuss.org/about-the-iuss/awards-prizes/the-iuss-jeju-award/*.

2022 Guy Smith Medal Award

In the December 2021 Alert, an invitation to propose nominees for the forthcoming *Guy Smith Medal* award was published. The next award will be handed over during the Glasgow 22nd World Congress of Soil Science (*https://22wcss.org/*), 31st of July to the 5th of August, 2022.

Criteria for selection

The nominee should have the following qualifications:

1. She/he must have made a significant scientific contribution that has advanced the field of soil classification, *and*
2. Be a published author in the field of soil classification; *and*
3. Be an active member, Honorary member, or formerly active member of a national or international soil science professional society, *and*
4. The medal is not invested posthumously, *and*
5. Present officers of IUSS Commission IUSS cannot be nominated.

The proposal for nomination should comprise a short text, including the main steps of the scientific career of the nominee, her/his most relevant scientific publications and major contribution to the development of soil classification.
For more information, please refer to the *web-link of the IUSS Commission 1.4* (Soil Classification):
Read more: *https://www.iuss.org/about-the-iuss/awards-prizes/guy-smith-medal/*.

Richard Webster Medal 2022

The Richard Webster Medal is an award by the Pedometrics Commission of the International Union of Soil Sciences. The award is for the best body of work that has advanced the discipline of pedometrics: the application of mathematical and statistical methods to problems in the understanding of soils in space and time, and the provision of information for their better management.
The Richard Webster Medal will be awarded at the 2022 World Congress of Soil Science. The award is judged by the Pedometrics Commission Awards Committee on the basis of nominations received.
Nominations were to be sent to the Committee Chair, Professor Murray Lark at *murray.lark@nottingham.ac.uk*.
Anyone considering sending a nomination should examine the guidelines for the award carefully at *http://pedometrics.org/the-richard-webster-medal/* and make sure that their proposed candidate is eligible, and is willing to be nominated. Note that the requirements for the written evidence will be strictly adhered to, and any nomination which consists only of a curriculum vitae for the candidate, with no covering statement as requested, will be discarded.

ICoSM 2022 Young Micromorphologist Awards

We postponed the date for submission of documents to the ICoSM 2022 Young Micromorphologist Awards until 28 February 2022.
We also ask all who are interested in attending the conference to register at *http://www.icosm2020.sggw.pl/registration/*.
Read more: *http://www.icosm2020.sggw.pl/scholarships/*.

Election of IUSS Division and Commission Officers 2022-2026

Results of Election of IUSS officers 2022-2026

Every four years elections of the officers for Divisions and Commissions take place. All officers except the appointed Vice-Chairs of the Divisions can be re-elected for one further term. The election of IUSS officers for 2022-2026 started in September 2021. In total 104 candidates from 26 different countries were nominated, valid votes from 39 national soil science societies (IUSS Full members) were received until January 28, 2022.
Download the election results: *https://www.iuss.org/media/iuss_officers_election_2021_results.pdf*.

Let us congratulate all elected IUSS officers.
We are looking forward to a fruitful collaboration.
The term of the elected officers will start at the end of the WCSS 2022, on August 5, 2022.

Elected Division and Commission officers:

Division / Commission	Office	Candidate	Country
Division 1 – Soils in Space and Time	chair	Richard Heck	Canada
Commission 1.1 Soil morphology and micromorphology	chair vice chair	Fabio Terribile Adam Csorba	Italy Hungary
Commission 1.2 Soil geography	chair vice chair	Sergey V. Goryachkin Eduardo Guimarães Couto	Russia Brasil
Commission 1.3 Soil Genesis	chair vice chair	Endre Dobos Yuji Maejima	Hungary Japan
Commission 1.4 Soil Classification	chair vice chair	Cornelius van Huyssteen David Badía-Villas	South Africa Spain
Commission 1.5 Pedometrics	chair vice chair	Alexandre Wadoux Simone Priori	France Italy
Commission 1.6 Paleopedology	chair vice chair	Maria Bronnikova Elizabeth Solleiro-Rebolledo	Russia Mexico
Division 2 – Soil properties and processes	chair	Giuseppe Corti	Italy
Commission 2.1 Soil physics	chair vice chair	Silvia C. Imhoff Cezary Sławiński	Argentina Poland
Commission 2.2 Soil chemistry	chair vice chair	Otilio Arturo Acevedo Sandoval Karen Vancampenhout	Mexico Belgium
Commission 2.3 Soil biology	chair vice chair	Alberto Acedo Becares Magdalena Frąc	Spain Poland
Commission 2.4 Soil mineralogy	chair vice chair	Sofia N. Lessovaia Edson Campanhola Bortoluzzi	Russia Brazil
Commission 2.5 Soil chemical, physical and biological interfacial reactions	chair vice chair	Elke J. Noellemeyer Pablo Cornejo	Argentina Chile
Division 3 – Soil Use and Management	chair	Abbey Wick	USA
Commission 3.1 Soil Evaluation and Land Use Planning	chair vice chair	Jagdish Prasad Morihiro Maeda	India Japan
Commission 3.2 Soil and Water Conservation	chair vice chair	Lillian Øygarden Dorota Agnieszka Dec	Norway Chile
Commission 3.3 Soil Fertility and Plant Nutrition	chair vice chair	Fernando O. García Luciano Colpo Gatiboni	Argentina Brazil
Commission 3.4 Soil Engineering and Technology	chair vice chair	Yuanfang Huang Taku Nishimura	China Japan
Commission 3.5 Soil Degradation, Control, Remediation and Reclamation	chair vice chair	Stefan Norra Anna Karczewska	Germany Poland
Commission 3.6 Salt Affected Soils	chair vice chair	Jorge Batlle Sales Sanjay Arora	Spain India
Division 4 – The Role of Soils in Sustaining Society and the Environment	chair	Claudio Zaccone	Italy
Commission 4.1 Soils and the Environment	chair vice chair	Miriam Muñoz Rojas Nobuhide Fujitake	Spain Japan
Commission 4.2 Soils, Food Security and Human Health	chair vice chair	Taru Sanden Takuro Shinano	Austria Japan
Commission 4.3 Soils and Land Use Change	chair vice chair	Gary Feng Felipe Andrés Zúñiga Ugalde	USA Chile
Commission 4.4 Soil Education and Public Awareness	chair	Martha M. Bolanos-Benavides	Colombia
Commission 4.5 History, Philosophy, and Sociology of Soil Science	chair vice chair	Alexandra Toland Anna Krzywoszynska	Germany Germany

IUSS Presidential Elections 2022 – Call for nominations

The election of the next President of the IUSS is due this year. The appointment of the President represents a total of six years commitment to the Union by serving two years each as President-Elect (2023/24), President (2025/26) and Past-President (2027/28).
The Standing Committee on Presidential Elections has defined the respective procedure and the guidelines. Nominations should be made by two accomplished, highly-respected senior soil scientists.

Full nomination documentation were to be submitted electronically to Prof. Dr. Rainer Horn (Email: *rhorn@soils.uni-kiel.de*) by May 31, 2022. A copy was to be sent to *iuss@umweltbundesamt.at*.
Procedure and guidelines: *https://www.iuss.org/about-the-iuss/iuss-presidential-election/*.

Other IUSS News

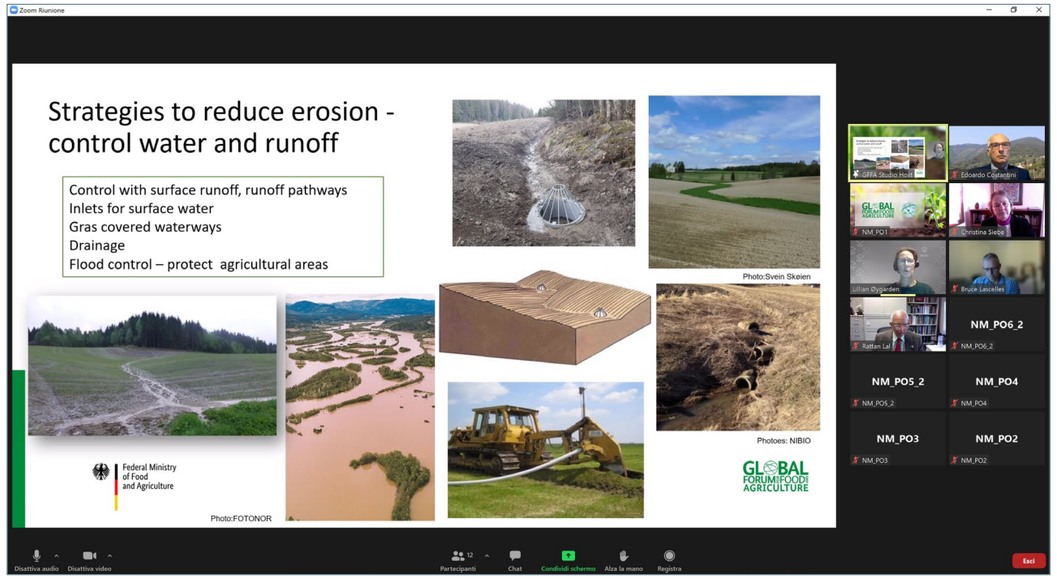
International Symposium on Managing Land and Water for Climate-Smart Agriculture

The International Atomic Energy Agency (IAEA) is organizing an International Symposium on Managing Land and Water for Climate-Smart Agriculture in Vienna from 25 July 2022 to 29 July 2022. Approximately 400 participants from IAEA Member States and invited international organizations are expected to attend this event.
The purpose of the event is to review recent development of nuclear, isotopic and related techniques to improve land and water management practices, provide information on the development of tools and technology packages to build soil resilience, adapt farming practices to the impact of climate change, as well as to nuclear or radiological emergencies; and to identify knowledge gaps, research needs and new opportunities to develop climate-smart agricultural practices to build capacities and transfer of technologies to Member States. The event is aimed at scientists, academics, research managers and laboratory personnel, policy makers from governmental, non-governmental and international organizations, donor agencies and potential partners.
Please note that **IUSS will** give **a keynote speech** (Rainer Horn), and **exhibit** during the symposium.

Activities of the IUSS at the Global Forum for Food and Agriculture 2022

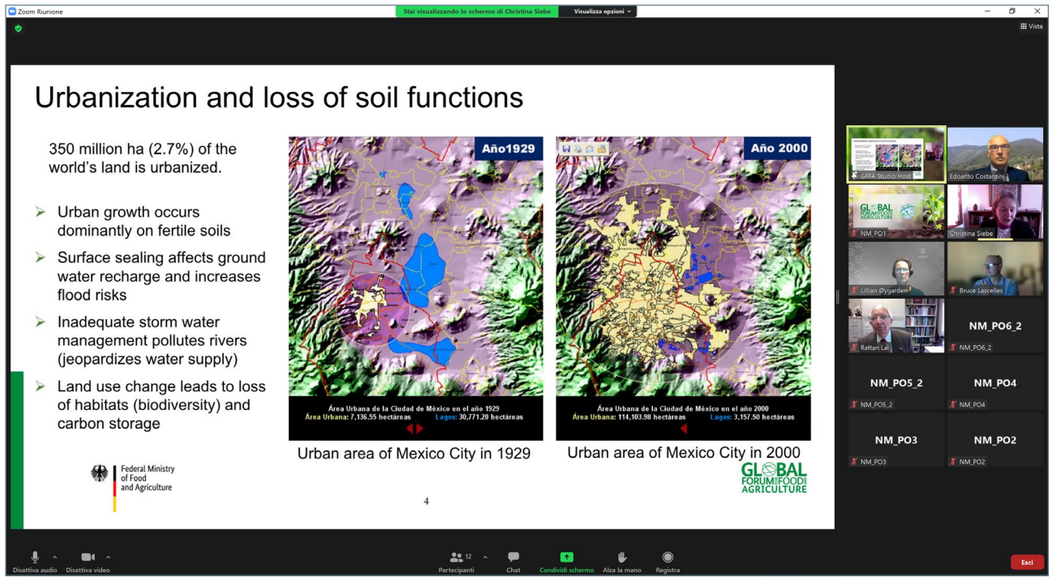
The IUSS has organized the first Expert Panel "Global perspectives on sustainable soil management towards food security" at the Global Forum for Food and Agriculture 2022 on the 24th of January 2022. The panel received a remarkable interest, witnessed by an audience of 176 people. Read more here:
https://www.gffa-berlin.de/en/fachpodien_2022/iuss/.
The panel was moderated by Edoardo A.C. Costantini, President Elect of the IUSS and senior researcher at the CNR-IBE of Florence, Italy, and saw the participation of four outstanding colleagues of the IUSS: Dr. Lillian Øygarden, researcher in the department "Soil and Land use" at Norwegian Institute of Bioeconomy Research, chair of the IUSS commission "Soil and Water Conservation"; Dr. Bruce Lascelles, Director of Sustainable Land Management at Arcadis and President of the British Society of Soil Science; Dr. Christina Siebe, senior researcher at the Department of Soil and Environmental Sciences of the Institute of Geology of the National Autonomous University of Mexico; Dr. Rattan Lal, Distinguished University Professor and Director of the Center for Carbon Management and Sequestration, the Ohio State University, and former President of the IUSS.

Dr. Costantini introduced the IUSS. The IUSS is a global organization that puts together the soil science societies of 80 countries and has about 50,000 members, all people who are very passionate about the knowledge of soil and the preservation of its health; since they do believe that it is soil health that grants life on earth and at the same time grants the achievements of all the sustainable development goals set by the United Nations. The four IUSS prominent soil scientists presented global perspectives on sustainable soil management towards food security with different geographic and thematic perspectives.
Dr. Øygarden reported on soil and water conservation under Northern Climatic conditions – sustainable land management to secure high yields and improve soil protection. When there is pressure on available areas for food production it is important with high yields on the existing areas to ensure sustainable utilization of input resources and save nature areas from new cultivation.
The expected changes in climate give new challenges with wet and cold conditions for agricultural management and also to an expected increase in soil erosion. There is a need to protect soil better for changed precipitation and runoff conditions to secure land for food production and minimize pollution of surface, drinking water.
Dr. Lascelles talked about the role of soils in supporting the creation of greener developments – under the perspective of a temperate country like the UK. Clear planning for soil management and re-use is critical in retaining the potential value of soils. This requires knowledge of the soils and specialist input to soil handling strategies, and a wider understanding of how new developments can be designed to maximise the extent of soil included, the health of that soil and how it can be used to support the community, from green spaces for climate adaptation to local food production.
Dr. Siebe presented the issue of urban soils, which is pertinent to every part of the word but particularly in megacities. The title of her presentation was "The role of soils for the sustainability of periurban and urban areas in megacities". The human population is not only increasing but becoming predominantly urban. In 2030 more than 70% of the world's population is expected to live in urban areas and there will be at least 24 megacities (> 10 million inhabitants). Urbanization is sealing fertile land and impeding water infiltration and aquifer recharge jeopardizing the food, water, and energy supply of city dwellers.
In urban environments, large quantities of very different kinds of waste materials are produced. Among them are organic wastes and wastewater, which are assets of utmost importance to increase agricultural productivity. Yet they need to be appropriately prepared or treated previous to their application to soil, to protect human and ecosystem health. Fertile soil sealing has to be avoided and waste materials should be properly used to construct soils of gardens, green roofs and green areas. Organic wastes can be either composted or used to generate



Strategies to reduce erosion presented by Lillian Øygarden (© E. Costantini)

energy, while the resulting biochar is applied to soil capture C. The reuse of treated wastewater in periurban agriculture sets high-quality water-free for human consumption. It has become mandatory to recognize and preserve urban soil functions to achieve sustainability. Dr. Lal's lecture changed the perspective to the global issue about Transforming the World Food Systems by a Soil-Centric Strategy. Between 1961 and 2020, the per capita cereal production increased 32% to 376 kg/a when the human population increased by 2.5 times but cereal production 3.3 times over the same period. However, the quantum jump in agronomic productivity depended on the increase by 9 for use of nitrogenous fertilizer and by ~ 5 for P and K fertilizers, while the irrigated land area increased by a factor of 2.4. Soil degradation affects one-third of the ice-free land, and 30% of all greenhouse gases emitted are attributed to global food production systems. The "One Health "concept states that "health of soil, plants, animals, people, ecosystems and planetary processes is one and indivisible ". Therefore, rather than a problem, the adoption of recommended management practices for diverse agricultural regions can be a part of the solution. Therefore, there is a strong need for the transformation of global food systems. Based on the concept of regenerative agriculture and agroecology, the Green Revolution of the 21st century must be soil centric, ecosystem-based, and driven by science and aimed at producing more from less, practising nutrition-sensitive agriculture, and returning some land and water back to nature. It is also important to grow soil C as a farm commodity that can create another income stream for land managers.



Above: A slide of Bruce Lascelles showing the importance of soils in supporting the creation of greener developments
Below: Relationships between urbanization and soil functions showed by Christina Siebe (both: © E. Costantini)

The discussion that followed the presentations highlighted the increasing competition for the use of natural resources, in primis soil and water, which exacerbates the conflictual relationship between rural and urban areas, and between the regions at different degrees of development and richness. This crisis also involves the management of wastes and wastewaters and has become so evident that local and global authorities, as well as citizens and laypeople, have increasingly concerned and trying to find solutions. Unfortunately, though, the role of soil is not yet fully acknowledged, at all decisional levels, despite the many scientific shreds of evidence, like those shown in this expert panel, which highlight the relevance of soil knowledge and the failure of policies that ignore it. The challenge is to translate scientific knowledge into practice. The panellists showed several examples of soil-based approaches and best practices, based on scientific knowledge and cooperation with authorities and stakeholders, which can mitigate or resolve the conflicts.

Above:
The nexus linking the health of soil, human, planet presented by Rattan Lal
Below:
The IUSS moderator and speakers at the expert panel (both: © E. Costantini).

Acknowledgement:
All the pictures were taken by E. Costantini from the online presentation.

Paleopedology Newsletter

The December 2021 issue of the Paleopedology Newsletter (no. 31), which is a joint initiative of the IUSS Commission 1.6–Paleopedology and INQUA Palaeopedology Working Group, is now available on the IUSS website.
Read more: *https://www.iuss.org/newsroom/newsletters/paleopedology-newsletters-commission-16/*.

Soil videos now available on YouTube

In 2020, the IUSS Working Group WRB made videos on soil description and classification in German, English and Spanish. In the German video, the German system is used. In the English and the Spanish video, we use the FAO Guidelines (2006) for soil description and the WRB (2015) for soil classification. The videos were originally a result of the pandemics, but may be of general interest. They are available on the homepage of the TUM School of Life Sciences. As of 16 March 2022, they are also available on YouTube: *https://www.youtube.com/channel/UC-dL7jrqhzwoFfKNLTwGXxQ/videos*.

News from IUSS Commission 1.1 – YMPA'22

We are extending the deadline for applications for the Young Micromorphologist Publication Award – 2022 Competition, until 24:00 CET on June 15th, 2022. Application packages should be sent directly to the Chair of Commission 1.1. (Prof. Fabio Terribile, *fabio.terribile@unina.it*). Detailed procedures can be found in the Winter'22 email (circulated by email on 16 January 2022).

IUSS Division 2 recommends scientific paper

Hiroaki Shimada, RotaWagai, Yudzuru Inoue, Kenji Tamura, Maki Asano. Millennium timescale carbon stability in an Andisol: How persistent are organo-metal complexes? Geoderma 2022, 417 (1), 115820.
https://doi.org/10.1016/j.geoderma.2022.115820.
The paper has been selected as Editor's choice for May in Geoderma.
Soil organic carbon (SOC) is the largest reservoir of terrestrial carbon, providing significant ecosystem services. Due to the SOC degradation by improper human activities, more knowledge on SOC stability is important. This paper shows factors controlling millennium timescale stability of SOC under aerobic soil environment by comparing two buried Andisol horizons (2A and 4A) having different burial period (500 and 4,600 years based on tephra chronology) in Japan. The results show that linear relationship between SOC and pyrophosphate-extractable Al + Fe concentrations across all layers. But aromatic C was not the dominant C group, indicating that the molecular recalcitrance of aromatic compounds cannot fully account for long-term SOC stability. Furthermore, the paper shows that organo-metal complexes changed over the 4,100 years to the older horizon, that is, O-alkyl C declined more compared to aromatic C; Metals correlated more with alkyl C; Distribution of SOC and the metals was shifted from 0.2–2 µm to <0.2 µm fraction, suggesting partial breakdown of the microaggregates where organo-metal complexes likely acted as glue.
The paper suggested that these changes may lead to the disappearance of buried A horizons in 10,000-year time scale. These information on the log-term SOC stability would help to understand human impacts on C cycle and climate change.
Read more: *https://www.sciencedirect.com/science/article/pii/S0016706122001276?via%3Dihub*.

Patrick H. Walker (1929-2022)

It is with sadness that we advise the passing of Dr, pioneering Australian soil scientist. Dr. Patrick H. Walker has passed away after a short illness on the Central Coast of NSW, aged 93. Pat will be remembered as a perceptive, dedicated and generous researcher, administrator and mentor who made an enduring contribution to our understanding of Australian soils. After beginning his career at the NSW Department of Agriculture in 1951, he spent many years as a senior researcher and later an Assistant Chief at the CSIRO Division of Soils in Canberra. He was a visiting Professor at the Faculty of Applied Science, University of Canberra from 1991-1993, is a past Prescott Medallist and State President of the Australian Society of Soil Science as well as a recipient of many awards and professional affiliations. Soil Science Australia would like to acknowledge Pat's industrious contribution to soil science and SSA and offers its sincere sympathy to Pat's family and friends.
From an obituary written by Associate Professor Vanessa Wong CPSS, Federal President.

Report of Division 1: Soils in Space und Time

Please note that the main division report was submitted in March 2022. Some of the events and activities referred to may have taken place in the interim.
Division 1 deals with the soil body in the landscape context. The commissions and working groups coordinate, and harmonize research activities on observation, genesis, classification and mapping of the soil body and landscapes and communicate results to the soil science community, soil users and the general public.

Structure and officers:
Chair: Erika Michéli, Hungary
1st Vice Chairperson: Matt Aitkenhead, United Kingdom
2nd Vice Chairperson: Jacqueline Hannam, United Kingdom

Vice Chairs are responsible mostly for the organization of the World Congress. The Chair is responsible for communication with the commissions, working groups and vice chairs.

IUSS Division 1. Commissions and Working Groups:
- *Commission 1.1 – Soil Morphology and Micromorphology*
- *Commission 1.2 – Soil Geography*
- *Commission 1.3 – Soil Genesis*
- *Commission 1.4 – Soil Classification*
- *Commission 1.5 – Pedometrics*
- *Commission 1.6 – Palaeopedology*
- *Working Group Cryosols*
- *Working Group Digital Soil Mapping*
- *Working Group Digital Soil Morphometrics*
- *Working Group Global Soil Map*
- *Working Group Proximal Soil Sensing*
- *Working Group Soil Information Standards*
- *Working Group Soil Monitoring*
- *Working Group Universal Soil Classification*
- *Working Group World Reference Base for Soil Resources*

Commission 1.1 – Soil Morphology and Micromorphology

Chair: Fabio Terribile, Italy
Vice Chair: Richard J. Heck, Canada
The commission is dealing with soil as a continuous natural body that has spatial and temporal dimensions (soil cover or pedosphere) and studies the organization of its organic and inorganic constituents on different scales from micro to macro. They closely cooperate with IUSS units dealing with palaeopedology and soil genesis.

Awards

The Commission has two awards, the Kubiëna Medal and Young Micromorphologist Publication Awards. The Young Micromorphologist's Publication Award 2021 winner was Dr. Jennifer Kielhofer.

Events

The difficulties about the CODID19 pandemic have already been reported earlier and this has affected many activities of our members.
The first Virtual Micromorphology Meeting organised by Dagmar Fritzsch (University of Frankfurt), Astrid Röpke (University of Cologne) and Christine Pümpin (University of Basel) took place successfully on April 23th. A total of 129 micromorphologists from 30 countries all over the world registered and participated actively. The programme included four great talks given by Y. Devos (Vrije Universiteit Brussel), K. Ismail-Meyer (University of Basel), R. Shahack-Gross (University of Haifa) and L. Lisá (Czech Academy of Science) and three exciting live microscopy sessions conducted by H. Huismann (Groningen University), Q. Borderie (ArScAn – UMR 7041) and C. Mallol (Universidad de la Laguna) with thin sections shared via Zoom.

Planned future activities

- The 16th International Conference on Soil Micromorphology ICOSM will be hold in Kraków, Poland from September 4-8 2022.
- Archaeological Micromorphology short intensive course (April 19-27, 2022).
- 8th Intensive Course of Soil Micromorphology (9-20 of May 2022).
- Archaeological Soil and Sediment Micromorphology Course (June 6-10, 2022).
- Micromorphology course at the 16th International Conference of Soil Micromorphology (August 29 and September 3, 2022).
- 4th Latin-American Intensive Course on Soil Micromorphology (IV curso latino-americano de micromorfología de suelos).

Publications

Golubtsov, Viktor; Bronnikova, Maria; Khokhlova, Olga; Cherkashina, Anna; Turchinskaia, Sofiia. 2021. Morphological and isotopic study of pedogenic carbonate coatings from steppe and forest-steppe areas of Baikal region, South-Eastern Siberia. CATENA. 10.1016/j.catena.2020.104817.

Huf dos Reis, Aline M.; Auler, Andre C.; Armindo, Robson A.; Cooper, Miguel; Pires, Luiz F.. 2021. Micromorphological analysis of soil porosity under integrated crop-livestock management systems. Soil & Tillage Research. 10.1016/j.still.2020.104783.

Van Thuyne, John; Darini, Isacco; Mainga, Ali; Verrecchia, Eric P.. 2021. Are fungus-growing termites super sediment-sorting insects of subtropical environments? JOURNAL OF ARID ENVIRONMENTS. 10.1016/j.jaridenv.2021.104566.

Kulick, Rachel; Westgate, John. 2021. Tephrochronology and micromorphology of Theran tephra deposits at Palaikastro, Crete. Journal Of Archaeological Science-Reports. 10.1016/j.jasrep.2021.102884.

Masseroli, A.; Villa, S.; Mariani, G. S.; Bollati, I. M.; Pelfini, M.; Sebag, D.; Verrecchia, E. P.; Trombino, L.. 2021. Reconsidering the compound effect of geomorphology, vegetation, and climate change on paleopedogenesis in sensitive environments (Northern Apennines, Italy). CATENA. 10.1016/j.catena.2020.104951.

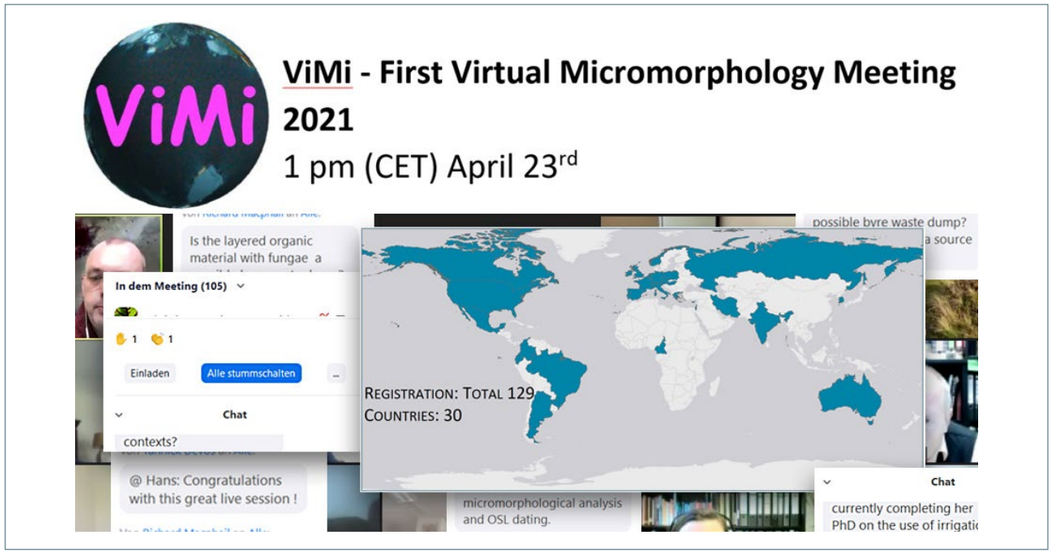
Link to Newsletter

https://www.iuss.org/newsroom/newsletters/soil-morphology-and-micromorphology-newsletters-commission-11/.

WCSS sessions organized

(i) soil carbon: from particle to planet
(ii) Novel methods and techniques
(iii) Soil structure – Observation, resilience and its role in ecosystem functioning

and several co-organized by other Commissions.



Summary Figure of the first Virtual Micromorphology Meeting (© Commission 1.1)

Commission 1.2 – Soil Geography

Chair: Thomas Scholten, Germany
Vice Chair: Sergey V Goryachkin, Russia
The commission is dealing with the development and spatial distribution of soils worldwide and its many morphogenetic attributes and properties. Soil formation is understood as a complex adaptive interplay of biological and physico-chemical processes driven by environmental climate, organisms including humankind, topography including certain hydrologic features, parent material, and age of soil.

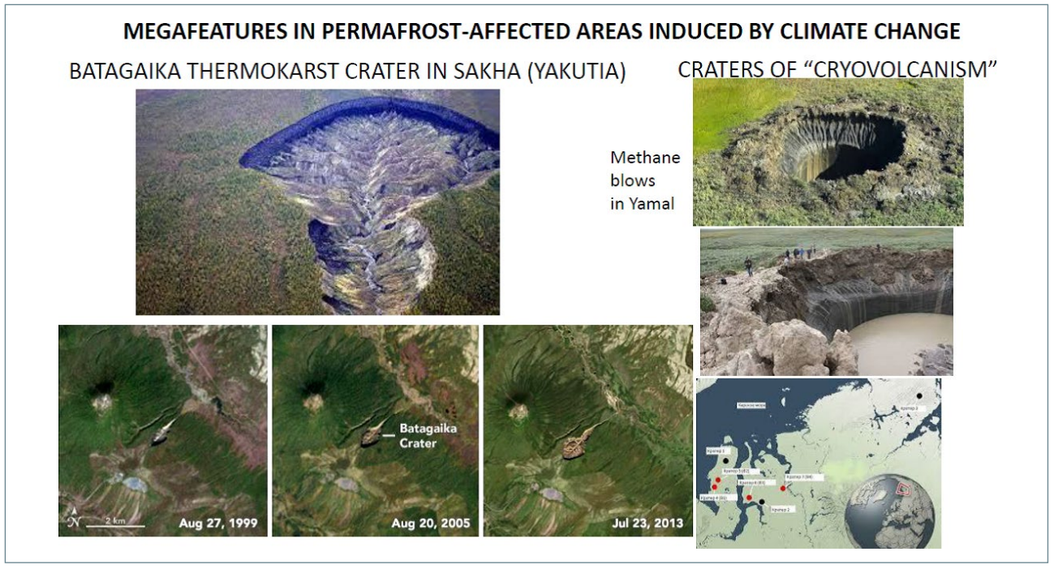
Awards

The Commission 1.2. established the Gold Medal named after V.M. Fridland for the soil scientists for outstanding success in the field of geography and cartography of soils. Professor Vladimir Markovich Fridland is well known among soil scientists and geographers in the world for his contribution to several spheres in soil genesis, geography and soil mapping, part of which is his theory of soil cover pattern. His life was rather short, and during its active "pedological" period, namely, 1950ies-1983, he created three new and important spheres in soil science. One, the earliest and most known to specialists in Earth sciences, is the theory of soil cover patterns (Fridland 1976), the second is the original three-component basic soil classification, and the last one is the soil map of Russian Federation, scale 1:2.500 000; today, it is the only real detailed map of the whole country, published posthumously, in 1988. Commission 1.2. found sponsors for the Fridland Gold Medal and prepared an application to the IUSS for the approval of the status of this award.

Events (in chronological order starting with the oldest)
The Commission participated and supported the organization of several events such as the European Geosciences Union General Assembly (EGU) 2021. Further, it assists in the scientific planning of excursions of the German Soil Science Society being part of the 2022 congress in Trier, Germany.

Recent activities

The Commission is also closely cooperating with Global Soil Map Working Group as well as with the Cryosols, the Paleopedology and the Pedometrics Working Groups.
The chair is actively participating in the IUSS Research Forum and the organization of the Eurosoil 2021 meeting as well.
The vice-chair, Sergey Goryachkin, gave the lecture "Climate change and different ways of permafrost-affected soils transformation: practical consequences" at the International Electronic Conference on Soil Science "The impact of climate change on soil degradation".



The "mega-results" of permafrost-affected soils degradation due to climate change in Siberia.
Fragment from S. Goryachkin's talk (© Goryachkin)

Planned future activities

- August 2022, Glasgow – Session 14 "Soil geography: basic science and new technologies".
- October 2022, Moscow – The session in Memorial of the pronounced soil geographer Ilia Sokolov (90 anniversary).
- April 2023, Vienna – session at the EGU General Assembly.
- September 2023, Salekhard – The 8th International conference on Cryopedology.

Publications

Łukasz Musielok, Krzysztof Buczek, Tymoteusz Karcz. Relief-induced feedback mechanisms controlling local podzolization occurrence on flysch slopes – Examples from Outer Western Carpathians (southern Poland), CATENA,Volume 213, 2022, 106124.

Desyatkin Roman, Filippov Nikolai, Desyatkin Alexey, Konyushkov Dmitry, Goryachkin Sergey. Degradation of Arable Soils in Central Yakutia: Negative Consequences of Global Warming for Yedoma Landscapes //Frontiers in Earth Science. 2021. Vol. 9. 795.

Fabricio Fernandes Coelho, Elvio Giasson, Alcinei Ribeiro Campos, Ryshardson Geovane Pereira de Oliveira e Silva, José Janderson Ferreira Costa. Geographic object-based image analysis and artificial neural networks for digital soil mapping, CATENA,Volume 206, 2021, 105568.

Thomas Loiseau, Dominique Arrouays, Anne C. Richer-de-Forges, Philippe Lagacherie, Christophe Ducommun, Budiman Minasny. Density of soil observations in digital soil mapping: A study in the Mayenne region, France, Geoderma Regional, Volume 24, 2021, e00358.

Mercedes Román Dobarco, Alex McBratney, Budiman Minasny, Brendan Malone. A modelling framework for pedogenon mapping. Geoderma, Volume 393, 2021, 115012.

WCSS Session organized

Session 14 "Soil geography: basic science and new technologies.

Commission 1.3 – Soil Genesis

Chair: Endre Dobos, Hungary
Vice Chair: Megan Balks, New Zealand
This Commission quantifies the fundamental physical, chemical, biological, and mineralogical processes (pedogenic) of gains, losses, translocations, and transformations occurring in soils from micro to macro scales to explain and understand profile formation. It utilizes fundamental knowledge gained from other disciplines to model dynamics and processes responsible for soil behaviour at the landscape or ecological scale. This information is integrated with that of other scientific databases to quantify environmental interactions under which soils formed in both modern and paleo times.
Besides of the traditional soil genesis research, the commission maintains its focus on translating the core soil genesis knowledge into simple, easy to use and apply indicators to assess the benefits of soil improving practices and communicate them to the end-users, meaning both the farmer and the administrative segments.

Events: ***Due to the pandemic no face-to-face event***
5th of December, Soil day. Regenerative agriculture case study video demonstration on good practices of soil improving agricultural approaches.

Recent activities

Development of Knowledge repository initiative and virtual profile visits *https://dobosendre.hu/oktatovideok/*; *https://www.youtube.com/channel/.../videos*.

Planned future activities

Organization of the national selection contest for the Hungarian team for International Soil Judging Contest in Glasgow, 12 April, 2022
Online conference will be organized for the fall of 2022 on "Man driven soil genesis to improve soil quality of the agricultural lands". The goal is to develop a scientific knowledge support for the farmers and practitioners on the regenerative agriculture. A European project proposal has been submitted including four countries in Central-Europe on this topic, targeting scientific repository development in five languages, presenting scientifically documented good practices and a connected awareness raising campaign for farmers and community outreach.

WCSS Session organized

Soil genesis session with 8 presentations and 50 posters.

Commission 1.4 – Soil Classification

Chair: Curtis Monger, USA
Vice Chair: Bipin B. Mishra, India
Commission 1.4 is dealing with the continued development of soil classification as a means for understanding and communicating how soils can be placed into 3-dimentional "bodies" that differ across the landscape. The Commission is also dealing with soil classification as a tool for addressing environmental issues, such as the link between soil types and biodiversity, and agricultural issues that focus on how soils can be sustained and enhanced for food production.

Awards

The Commission has one award: *THE GUY SMITH MEDAL* in honor of Dr. Guy Smith, an internationally travelled taxonomist who drew on the expertise of a worldwide community of pedologists to develop "Soil Taxonomy," first published in 1975 after several approximations.
A call for nominations for the award was made in the fall of 2021 for the February 26th 2022 deadline.

Guy Smith Medal (© Deckers)

The interval for THE GUY SMITH MEDAL is now every four years. At the time when it was established during the IUSS Soil Classification Congress at Santiago de Chile in 2007 the time-interval of 2 years was chosen. However, in 2018 after the Rio conference to offer the Guy Smith Medal the decision was made to give the award once every 4 years rather than 2 years. The rationale for this change was that fewer scientists are working on classification and therefore fewer international taxonomists have the international stature required for the medal.
The Commission appreciates the work of the chair, Seppe Deckers, and the other committee members for their work on selecting an awardee.

Events

The 6th INTERNATIONAL SOIL CLASSIFICATION CONGRESS, after being postponed twice because of the COVID-19 pandemic, will now be held March 25 – April 9, 2022 with the field tour traveling through Coahuila, Nuevo León, San Luis Potosí, and arriving in Querétaro for the conference itself followed by post congress courses. *Home – International Soil Classification Congress (iscc2020.org)*.
The schedule consists of the following dates:

- Arrival at Monterrey airport and transfer to Cuatro Ciénegas, March 24.
- Field Workshop Cuatro Ciénegas-Juriquilla, March 25 to 29.
- Conference in Juriquilla, March 30 to April 1.
- Post Congress Courses, April 4 to 9.

The conference was expanded to include a virtual component to allow the participation of a much larger audience. The deadline for abstracts was extended to Dec 31 which also enabled additional participants to attend the congress. The main topics of the congress are

1. New contributions in soil classification,
2. Impact of soil functions on soil classification,
3. Anthrosols and Technosols, some challenges for their classification,
4. Innovative tools in soil classification, and
5. Salinization dynamics and soil classification.

Recent activities

Commission 1.4 continues to work through the IUSS Research Forum to produce a "Global Map of the Potential for Soils to Sequester Atmospheric CO2 as Inorganic Carbon." The pilot project for working out the steps was completed and will be presented at the research forum. It will include soil chemistry, technology, and carbon isotopes. The project will also involve Commission 1.6 (Maria Bronnikova and Elizabeth Solleiro). The purpose of this involvement is to compare the rate of carbon sequestration by paleosols in the geologic past to modern soils. This proposed map will solicit Commission 1.4 members interested in a project to build a global inventory of soil inorganic carbon. As reported earlier, the focus of this project is not only inventory, but it is also focused on identifying those soils that have the potential for sequestering carbon under natural and amended conditions at the international scale.

Planned future activities

Given the attention on soil types and how they differ in their ability to sequester carbon and their links to biodiversity and other environmental issues, grant proposals are planned that will support participant travel to in-person tours and conferences and provide seed money for research.

Publications

"Soil Classification as a Tool for Sustainable Agriculture and Forestry" (in preparation) by Curtis Monger, Erika Michéli, Felipe Aburto, and Danny Itkin. The chapter is for an IUSS book led by Bal Ram Singh.

Lal R, Monger C, Nave L, Smith P. 2021 The role of soil in regulation of climate. Phil. Trans. R. Soc. B 376: 20210084. *https://doi.org/10.1098/rstb.2021.0084*.

Lal R, Johan Bouma, Eric Brevik, Lorna Dawson, Damien J. Field, Bruno Glaser, Ryusuke Hatano, Alfred E. Hartemink, Takashi Kosaki, Bruce Lascelles, Curtis Monger, Cristine Muggler, Georges Martial Ndzana, Stefan Norra, Xicai Pan, Remigio Paradelo, Laura Bertha Reyes-Sánchez, Taru Sandén, Bal Ram Singh, Heide Spiegel, Junta Yanai, Jiabao Zhang. 2021. Soils and sustainable development goals of the United Nations: An International Union of Soil Sciences perspective. Geoderma Regional. e00398. *https://doi.org/10.1016/j.geodrs.2021.e00398*.

Commission 1.5 – Pedometrics

Chair: Vera Leatitia Mulder, Wageningen University, the Netherlands
Vice Chair: Nicolas Saby, French National Institute for Agriculture, Food, and Environment (INRAE), France
The Commission deals with the application of mathematical and statistical methods for the study of the distribution and genesis of soils. The goal of pedometrics (and the WGs) is to achieve a better understanding of the soil as a phenomenon that varies over different scales in space and time.
The commission is very active in communication, including Twitter https://twitter.com/pedometrics?lang=en. They are circulating regular Newsletters called Pedometron, which provide very valuable details of the great activities of the Commission. The Newsletters can be downloaded from the Commission's web site: http://pedometrics.org.

Pedometrics awards

The Commission has three awards: The Best Paper in Pedometrics (yearly), the Richard Webster medal (every 4 years), and the Margaret Oliver Award for Early-Career Pedometricians (every 2 years).

Events

The Commission organizes a biennial conference (Pedometrics Conference) which showcases innovative research on the mathematical spatial and temporal modelling of soil. The latest meeting should have taken place in Indonesia in 2021. Unfortunately, due to COVID-19 the physical event has been cancelled until further notice. In order to keep the community together, we have organized 2 webinars. The first one took place from 2-4 February 2021 (*http://pedometrics.org/pedometrics-meetings/pedometrics-webinar-2021/*). Due to its success, a second webinar took place on 16-17 June 2021, *http://pedometrics.org/pedometrics-webinar-2-june-2021/*. This time we focus on topics relevant to the WGs Digital Soil Mapping and Global Soil Map.

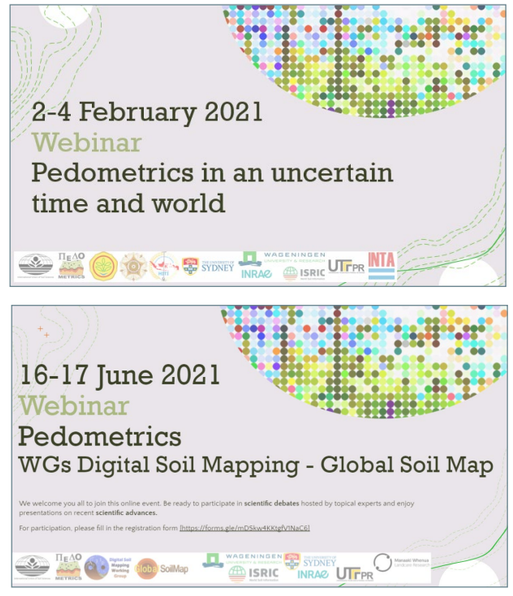
Recent Activities

Aside from the webinars, we are collaborating on scientific publications. The first collaborative paper was written by Wadoux et al. (*https://doi.org/10.1016/j.geoderma.2021.115155*) entitled 'Ten challenges for the future of Pedometrics'. In this paper, we have outlined contemporary problems in Pedometrics and developed a near-future research agenda. The work resulted from the earlier challenge that Gerard Heuvelink set for the Pedometrics community in 2019, *http://pedometrics.org/10-pm-challenges-forum/*.
In addition, a contribution is planned to the next soil word congress in Glasgow 2022. Session 13: How Pedometrics can cross boundaries and change society
(Conveners: Titia Mulder; Nicolas Saby)
Finally a contribution is also planned to the next EGU General Assembly 2022:

- Session SSS10.2 Statistical, computational and visualization tools for assessing soil complexity and variability; convener: Ana Maria Tarquis .
- Session SSS10.4 Digital Soil Mapping and Assessment; convener: Laura Poggio.
- Session SSS10.5 Pedometrics meets remote sensing for mapping and monitoring of soils; convener: Titia Mulder.
- Session SSS10.6 Soil Sustainability; convener: Dominique Arrouays.

Publication

Wadoux, A.M., Heuvelink, G.B.M., Lard, R.M., Lagacherie, P., Bouma, J., Mulder, V.L., Libohova, Z., Yang., L., McBratney, A.B. (2021). Ten challenges for the future of Pedometrics, Geoderma. 401, *https://doi.org/10.1016/j.geoderma.2021.115155*.



Flyers of the Pedometrics meetings
(© Commission 1.5)

WCSS Session organized

How Pedometrics can cross boundaries and change society.

Commission 1.6 – Palaeopedology

Chair: Maria Bronnikova, Russia
Vice Chair: Elizabeth Solleiro-Rebolledo, Mexico
The commission deals with soils as a memory of environmental change. Our research is concerned with paleosols and polygenetic soils with paleofeatures. Our studies are concentrated on pedo-litho-stratigraphy of soil-sedimentary sequences, soil morphology, and micromorphology, isotope signature, biomarkers and other soil environmental proxies. One of our goals is integration into paleogeography, Quaternary and geoarchaeological research and correlation of soil record with data obtained from other paleoenvironmental records.

Events

International paleopedology meeting: Paleosols and ancient societies – from early humans to the industrial revolution (June 10-12, 2021). This event was organized and hosted by the Mexican Working Group Researchers of the Quaternary and the Anthropocene (INCUA), Institute of Geography of the Russian Academy of Sciences (IGRAS), and UNAM, under an umbrella of the IUSS Commission 1.6 – Paleopedology, and INQUA, Paleopedology Working Group.
The main topic is concerned with linking paleosols to the history of the interactions between humans and the environment. This issue is particularly relevant today when human activities strongly affect the planet.
Fifty-four abstracts were received and divided into 5 scientific sessions:

- Paleopedological indicators of early human ecology along the migration routes out of Africa and beyond.
- Soil mantle under the impact of ancient agriculture: transformation, degradation and resilience. Paleopedological indicators of ancient land use. Man-made soils and soil horizons: artificial terraces, raised fields and plaggen.
- Features, processes and evolution of urban pedogenesis: settlement soils from the Paleolithic to the

Industrial era. Stratigraphy, microstratigraphy and micromorphology of the archaeological soil-sedimentary sequences and living floors that serve as a record/memory/archive of site formation processes and on-site life cycles.
- Soil as a raw material for ancient technologies (earth-architecture, pottery, etc.): provenance, chaîne opératoire and environmental effects.
- Soil chronosequences on artificial land surfaces as a tool for evaluating timescales, rates and characteristic times of pedogenetic processes.

From these contributions, 49 presentations (15 min each) were given by colleagues from Argentina (1), Belgium (1), Colombia (4), France (4), Germany (3), India (1), Israel (1), Italy (1), Poland (1), Mexico (15), Russia (16), United States (1).
The meeting was attended by 60 people from the speaker's countries, but also from additional countries, e.g., Brazil, Peru, and Switzerland. Discussions were very intense at the final of each session block. Following which, a special issue is planned for the Boletín de la Sociedad Geológica Mexicana (open access).
Commission 1.6 hold business meeting (June 11, 2021) in the frame of this online event.

Recent activities

EGU-2021: Commission 1.6 co-organized session Soils as records of past environmental conditions, climate change and anthropogenic impact in the program block SSS3 – Soils as Records in Time and Space, in Tue, 27 Apr, 09:00–12:30 (CEST). Convener: Oren Ackermann | Co-conveners: Anna Schneider, Kunshan Bao, Maria Bronnikova, Gaël Le Roux, Tobias Sprafke, Barbara Fiałkiewicz-Kozieł, Claudio Zaccone.
It contained 42 short (2-minutes) presentations in zoom format. Every presenter had an opportunity to upload a file with any additional materials which were accessible for all registered participants during 2 months.
Presented contributions were concerned with peatland records, loess-paleosol records, paleofires, man-impact in soils and sediments.

Eurosoil 2021: Connecting People and Soil: 24-28 August 2021, online format. Session related to the Paleopedology WG activities: 6.16 Soil archives to understand future changes of climate, landscapes, and the pedosphere. Conveners: Tobias Sprafke, Daniela Sauer, Maria Bronnikova. 6 orals and 6 posters have been presented.

We support Twitter profile *https://twitter.com/6Commission* was established in 2019 and further kept on by Danny Itkin.
We also support regular communication with commission members via Paleopedology@googlegroups.com.
In 2021-2022 we completed the updating of the address list of the group.

Planned future activities

EGU-2022 General Assembly Session No.: SSS3.2/CL5.2.13/GM3.10 will be held Monday, 23 May in hybrid format (Vienna, Austria) Conveners: Anna Schneider, Maria Bronnikova, Anna Andreetta, Oren Ackermann.
24 short oral presentations were accepted.
International Paleopedology online meeting and ECR-school are planned for November 2022. The events will be held by the Institute of Geography of the Russian Academy of Sciences (IGRAS) under an umbrella of the IUSS Commission 1.6 – Paleopedology, and INQUA Paleopedology Working Group.

Publications

Catena Special issue Contemporary soil and paleosol landscapes as records of past environmental conditions was processed in collaboration with EGU SSS3 – Soils as Records in Time and Space. Invited editors: Anna Schneider, Maria Bronnikova, Elizabeth Solleiro-Rebolledo (published online in Dec. 2021), Volume 199, April 2021. It includes 11 papers.
Special Issue of Boletín de la Sociedad Geológica Mexicana "Paleosols and ancient societies: from early humans to the industrial revolution". Invited editors: Georgina Arzave, Elizabeth Solleiro, Maria Bronnikova.
We have received 12 papers. 9 have already passed the first review round and were returned to the authors to correct them; 1 of these 9 has already been accepted. The rest is still under revision. Papers deal with different geoarchaeological issues in Argentina. Russia, Peru, Colombia, Africa and Mexico.
The SI is planned to be published at the end of this year.

Website

https://sites.google.com/site/palaeopedology/.
Link to Newsletters: *https://www.iuss.org/newsroom/newsletters/paleopedology-newsletters-commission-16/*.

WCSS sessions organized

Originally we applied for two sessions: "Paleosol as a domain of the geosystem environmental memory", "Archaeological soils and sediments as a record of ancient human-environment interactions", and commission business meeting. Our sessions were not accepted. Finally, we got only one joint session of 1.2 and 1.6 Session 12 "Soil Classification and Paleopedology" (co-chaired by Curtis Monger, Maria Bronnikova, Bipin B Mishra, and Elizabeth Solleiro-Rebolledo) with 28 oral and 13 poster submissions and only 8 orals accepted by the congress team. And finally, there is no opportunity for online participation in our session.
Commission 1.6 also is co-organizer of session 6. Dynamics of soil erosion and land loss under past, present and future environments at a special request of Division 1. This session is co-chaired by Artemi Cerdà and Maria Bronnikova.

Website: The website of Commission 1.6 Paleopedology *https://sites.google.com/site/palaeopedology/*.
Newsletters: *https://www.iuss.org/newsroom/newsletters/paleopedology-newsletters-commission-16/*.

Working Group Cryosols

Chair: Alexey Lupachev
WCSS session organized: Progress in understanding cryogenic soils at the ends of the Earth: mountainous, polar and periglacial regions.

Working Group Digital Soil Mapping

Chair: Laura Poggio, the Netherlands
Vice Chair: Alessandro Samuel-Rosa, Brazil
WCSS session organized: Digital Soil Mapping: advances towards Digital Soil Assessment

Working Group Digital Soil Morphometrics

Chair: Alfred Hartemink, USA
The working group is working under Commission 1.5: Pedometrics with close collaboration with other working groups of the Commission. Planned meetings in the reporting period were cancelled due to COVID-19. During meetings in the inter-congress period a merge with Commission 1.1. was suggested.
WCSS session organized: Progress in Digital Soil Morphometrics – deeper and more precise soil observations.

Working Group Global Soil Map

Chair (GSM): Dominique Arrouays, France
Vice Chair: Pierre Roudier, New Zeland
Secretary: Zamir Libohova, USA).
Activities mostly together with Comission 1.5 and Working Group DSM
WCSS session organized: Global Soil Map, main advances and ways forward.

Working Group Proximal Soil Sensing

Chair: Craig Lobsey, Australia
Vice Chair: Asim Biswas, Canada
WCSS session organized: Sensing soil chemical, physical and biological properties – advances and emerging techniques.

Working Group Soil Information Standards

Chair: Fenny van Egmond, the Netherlands
Vice Chair: Rainer Baritz, Denmark
The WG is encouraging international cooperation on soil information standards, soil information systems and their communication through data exchange standards. It anchors this cross-domain topic in the soil domain and mirrors similar efforts in the data domain. Since this topic was part of Pillar 5 of the Global Soil Partnership, active WG members concentrated their international efforts there until summer 2021. Efforts are focussed on the development of a global soil data exchange standard building on existing (soil data) standards according to international soil description standards. The conceptual domain model has been developed and is currently implemented semantically. This is a cooperation between several projects and initiatives and the aim of the WG is explicitly to link and possibly align between existing and new initiatives and projects, such as GSP P5, ESP, ESIP Soil Ontologies, SIEUSOIL. EJP SOIL, INSPIRE, OGC, several projects in the Pacific and others.
WCSS session organized: Soil information standards and systems – current initiatives and advances.

Working Group Soil Monitoring

Chair: Thomas Bishop, Australia
Vice Chair: Ben Marchant, UK
WCSS session organized: Advances in soil monitoring.

Working Group Universal Soil Classification

Chair: Budiman Minasny, Australia
Vice Chair: Jingyi Huang, USA
The WG is functioning under Commission 1.4 Soil Classification with great overlap in membership and activities. The WG organized several skype workshops on the development of the principles of future harmonized soil description and classification systems. Members will meet in the planned Commission meeting in Mexico.
WCSS session organized: Advances in Universal Soil Classification

Working Group World Reference Base for Soil Resources

Chair: Peter Schad, Germany
Vice Chair: Stephan Mantel, the Netherlands
The Working Group takes care of the international soil classification system WRB.

Recent activities

Preparation of the 4th edition of the WRB.

Planned future activities

Field Workshop in Iceland, June 6 -13, 2022.

Link to Website
https://www3.ls.tum.de/boku/wrb-working-group/.
Link to Newsletter: *https://twitter.com/2015wrb/*.

WCSS session organized: Advances in understanding soils as reflected by the 4th edition of the WRB.

Report of Division 2: Soil properties and processes

Please note that the main division report was submitted in the beginning of March 2022. Some of the events and activities referred to may have taken place in the interim.
Division 2 integrates physics, chemistry, biology, mineralogy and pedogenesis to understand fundamental soil properties and processes that underpin soil behaviour. These phenomena are studied at multiple scales ranging from global to atomic.

Structure and officers

Chair: Ryusuke Hatano, Japan
1st Vice-Chairperson: Paul Hallett, United Kingdom
2nd Vice-Chairperson: Leo Condron, New Zealand
Vice Chairperson Centennial: Stefano Mocali, Italy

IUSS Division 2. Commissions and Working Groups

- *Commission 2.1 – Soil physics*
- *Commission 2.2 – Soil chemistry*
- *Commission 2.3 – Soil biology*
- *Commission 2.4 – Soil mineralogy*
- *Commission 2.5 – Soil chemical, physical and biological interfacial reactions*
- *Working group Hydropedology*
- *Working group Soil Modeling Consortium*

Activities of Division Chair and Vice-Chair in 2021 and in the first half of 2022

The Division and Commission Chairs had a very busy schedule in 2021, balancing COVID lockdowns with their research and teaching. A positive outcome has been the development of new teaching material that will have a long lasting impact. Some of these materials can be seen on YouTube and introduced in the FB group of Division 2. The Vice-Chairs have worked very hard to organize the symposium in WCSS Glasgow, 31 July to 5 August 2022. Division 2 contributes to four interdivisional sessions, six divisional sessions and two working group sessions. The session numbers and titles are as follows:

Interdivisional

2. Soil carbon: From particle to planet (Commission 2.2 and 2.3)
3. Interdisciplinary soil science for impact (Division 2)
4. Plant soil interactions and their roles in soil formation and sustainable crop production (Division 2)
9. Novel methods and techniques (Commission 2.4 and 2.5)

Divisional

15. Soil structure – Observation, resilience and its role in ecosystem functioning (Commission 2.1)
16. Nitrogen Cycling and Soil Health (Division 2)
17. Sustainable Use of Legacy Soil Phosphorus (Division 2)
18. Biogeochemical cycles in the soil – processes linking the abiotic and biotic realms (Commission 2.2)
19. Soil microorganisms under changing environment (Commission 2.3)
20. Soil biology in transition: from descriptive to mechanistical understanding (Commission 2.3)

Working group

36. WG2.1 The Legacy of Henry Lin and the future of Hydropedology
37. WG2.2 Modelling soil processes from ped to global scale.

Those sessions are crucial to understand the nature and processes of soil needed to establish proper soil management. Soil processes related to the dynamics and circulation of plant nutrients including carbon and nitrogen; soil structure and physicochemical properties, microbial reactions and interactions with plants that affect the soil processes; their measurement methods and modeling will be discussed in the sessions.
The Division Chair: He contributed to four papers in Soil System Sciences (#EGU21SSS) of EGU 2021, in Vienna, 19–30 April 2021 (online), to the symposium on Soil Education in the annual conference of the Japanese Society of Soil Science and Plant Nutrition (JSSSPN), in Sapporo, on 14-16 September 2021 (online), and to the symposium for the reconstruction of agriculture to look back the 10 years after the Fukushima Daiichi Nuclear Power Plant accident opened in Fukushima on 5 November 2021.
The Division Chair has published a book "The Soils of Japan" in the World Soils Book Series, as one of the editors.

He acts as a section EIC of Agricultural Soil of Agriculture, and as an editor of Geoderma Regional and as a guest editor of Frontier of Environmental science. He will be a convener of Division 2 session at the WCSS Glasgow "Nitrogen Cycling and Soil Health", and will publish the proceedings from Springer. Division 2 prepared WCSS travel award for early career person and nine graduate students or post-docs (within 5 years) were selected in June 2022. In WCSS 2022, he will contribute to three papers in working group session and contribute to "Peat soil management" in the IUSS Research Forum. He organized the chapters from Division 2 contributing to IUSS Divisional Special Publication titled "Managing Soils for Sustainable Agriculture – Present Situation and Future Challenges" which will be published in Soil and Tillage Research 2023.

The first Vice-Chair: As part of the International Soil Modelling Consortium WG, Hans-Jörg Vogel and first Vice-Chair established a new ISMC sub-group on Biophysics and Soil Structure that held its first workshop in January 2022. The first Vice-Chair acted as co-convener of the EGU session 'Co-Evolution of structure and function in soil: Exploration, evidence, concepts and theories from particle interfaces and microaggregates to the pedon'. He is co-editing the soil physics articles for the 2nd edition of the Encyclopedia of Soils and the Environment, due for publication in 2022. In February 2022, the University of Aberdeen, where he works, was awarded the Queen's Anniversary Prize for over 7 decades of research and teaching in soil science. This was one of 22 awards across the UK, with other recipients including the team behind the first ever COVID vaccine.
Read more: *https://www.queensanniversaryprizes.org.uk/winners/innovations-in-soil-science-to-combat-climate-crisis/*.

The second Vice-Chair: During the course of 2021, the second Vice-Chair was involved in the proposal, development, and management of specific Division 2 and relevant interdivisional sessions for the 2022 22nd World Congress of Soil Science. This included participating in monthly on-line meetings with other Vice-Chairs to develop and refine the congress programme, together with the assessment of submitted abstracts for a number of sessions. This work was very challenging given the continuing and evolving uncertainties associated with the impact of the global pandemic response on the composition and operation of the congress. He will co-convene one Division 2 session at the congress, together with two interdivisional sessions. He completed the assessment of abstracts submitted to several WCSS sessions, and contributed to finalising the science programme for the WCSS.

Vice Chairperson Centennial: He is creating the contents of the topic of IUSS Centennial in 2024, which will be "Soil health in achieving the Sustainable Development Goals", and is preparing the website of the Centennial and that will be presented at Glasgow.

Travel fund support

The funds were not used due to the COVID-19 Pandemic. In 2022, Division 2 prepared WCSS travel award for early career person and 9 graduate students or post-docs (within 5 years) were selected on 15 June 2022. The award will be presented after the WCSS2022.

Publications of division Chair and Vice-Chairs

The division Chair published nine journal papers and one book chapter in 2021 and 5 journal papers in the first half of 2022, including the following:

Hatano, R., Shinjo, H., Takata, Y., 2021. Overview. In: Hatano, R., Shinjo, H., Takata, Y. (Eds.), The Soils of Japan. Springer Nature Singapore Pte Ltd. *https://rd.springer.com/book/10.1007/978-981-15-8229-5*.

Arunrat, N., Sereenonchai, S., ***Hatano, R.***. Impact of burning on soil organic carbon of maize-upland rice system in Mae Chaem Basin of Northern Thailand. Geoderma, 392, 115002 (2021). *https://doi.org/10.1016/j.geoderma.2021.115002*.

Kitamura, R., Sugiyama, C., Yasuda, K., Nagatake, A., Yuan, Y., Du, J., Yamaki, N., Taira, K., Kawai, M. **Hatano, R**. Effects of Three Types of Organic Fertilizers on Greenhouse Gas Emissions in a Grassland on Andosol in Southern Hokkaido, Japan. Front. Sustain. Food Syst. 5:649613 (2021). *https://doi.org/10.3389/fsufs.2021.649613*.

Lal, R., Bouma, J., Brevik, E., Dawson, L., Field, D., Glaser, B., ***Hatano, R.***, Hartemink, A., Kosaki, T., Lascelles, B., Monger, C., Muggler, C., Ndzana, G., Norra, S., Pan, X., Paradelo, R., Reyes-Sánchez, L., Sandén, T., Singh, B., Spiegel, H., Yanai, J., Zhang, J. Soils and sustainable development goals of the United Nations: An International Union of Soil Sciences. Geoderma Regional, 25, e00398 (2021). *https://doi.org/10.1016/j.geodrs.2021.e00398*.

The first Vice-Chair published nine journal papers in 2021 and 5 journal papers in the first half of 2022 including the following:

Marin, M., Feeney, D.S., Brown, L.K., Naveed, M., Ruiz, S., Koebernick, N., Bengough, A.G., ***Hallett, P.D.***, Roose, T., Puértolas, J., Dodd, I.C. & George, T.S. 2021. Significance of root hairs for plant performance under contrasting field conditions and water deficit. Annals of Botany, 128, 1-16.

Zhong, X.-l., Li, J.-t., Naveed, M., Raffan, A. & ***Hallett, P.D***. 2021. A laboratory study to disentangle hydrological, mechanical and structural mechanisms of soil stabilization by plant mucilage between eroding and depositional zones of a slope. European Journal of Soil Science, 72, 125-140.

Geris, J., Verrot, L., Gao, L., Peng, X., Oyesiku-Blakemore, J., Smith, J.U., Hodson, M.E., McKenzie, B.M., Zhang, G. & ***Hallett, P.D.*** 2021. Importance of short-term temporal variability in soil physical properties for soil water modelling under different tillage practices. Soil and Tillage Research, 213, 105132.

The second Vice-Chair published 18 journal papers in 2021 and 15 journal papers in the first half of 2022 including the following:

Chen, X.D., ***Condron, L.M.***, Dunfield, K.E., Wakelin, S.A. and Chen, L. 2021. Impact of grassland afforestation with contrasting tree species on soil phosphorus fractions and alkaline phosphatase gene communities. Soil Biology and Biochemistry 159: 108274 (9 pp).

Gatiboni, L.C. and ***Condron, L.M.*** 2021. A rapid method to quantify key soil phosphorus parameters in agro-ecosystems. Geoderma 385: 114893 (9 pp).

Hummel, C., Boitt, G., Santner, J., Lehto, N.J., ***Condron, L.M.*** and Wenzel, W.W. 2021. Co-occurring increased phosphatase activity and labile phosphorus depletion in the rhizosphere of Lupinus angustifolius assessed with a novel, combined 2D-imaging approach. Soil Biology and Biochemistry 153: 107963 (10 pp).

Gaiero, J., Tosi, M., Bent, E., Boitt, G., Turner, B.L., Richardson, A.E., ***Condron, L.M.*** and Dunfield, K.E. 2021. Microbial communities influencing soil organic phosphorus mineralization during ecosystem development and pedogenesis along a coastal dune chronosequence in New Zealand. FEMS Microbiology Ecology 97: fiab034 (16 pp).

Simpson, Z.P., McDowell, R.W., ***Condron, L.M.***, McDaniel, M., Jarvie, H., and Abell, J. 2021. Sediment phosphorus buffering in streams at baseflow: A meta-analysis. Journal of Environmental Quality 50: 287-311.

Wakelin, S.W., Forrester, S.T., ***Condron, L.M.***, O'Callaghan, M., Clinton, P.C., Davis, M.R., Smaill, S.J. and Addison, S. 2021. Protecting the unseen majority: Land cover and environmental factors linked with soil bacterial communities and functions in New Zealand. New Zealand Journal of Ecology 45: 3422 (12 pp).

Facebook Group of IUSS Division 2

The FB Group "IUSS Division 2" is actively used for sharing the schedule and activities of the symposia, workshops and conferences, and information of books, papers and some other issues related to Division 2. More than 5,300 colleagues from 101 countries in all the continents have joined the FB Group. People aged 25 to 45 account for 64%. Women account for 27% of the visitors.
The FB group also shows the photos of the events opened in the several countries on and around the World Soil Day and of the parties for celebration of awarded scientist.
We welcome all who would like to join!
Address of the FB Group is *https://www.facebook.com/groups/213698576164024/*.

Commission 2.1 – Soil Physics

Chair: Stephan Peth, Germany
Vice-Chair: Brigitta Szabó (Tóth), Hungary
Soil physics deals with the physical properties of the soil, with emphasis on transport of matter and energy. Major research thrusts include modeling transport of inorganic, organic and microbial contaminants, fractal mathematics, spatial variability, geostatistics, computer-assisted tomography, and remote sensing of soil physical properties.

Events

The Eurosoil meeting 2021 in Geneva took place as a virtual conference from 23-27th August with more than 200 oral presentations focusing on six themes of UN Sustainable Development goals. About 10% of the talks were related to soil physical aspects spanning from soil water conservation, and effects of compaction, tillage, soil organic matter, organic residues and compost on soil structure and soil health showing the importance of soil physical properties in soil management.
At the EGU in 2021 six soil physics sessions were convened with a focus on water and heat transport and biogeochemical reactions in the vadose zone and on soil structure dynamics and its relevance for soil functions.
At the upcoming event in 2022 water, energy and solute transport and soil structure seem to be still the two major topics currently in focus. For further information visit *https://meetingorganizer.copernicus.org/EGU22/sessionprogramme#SSS6*.

We are all looking forward to the upcoming WCSS Meeting in Glasgow. We had an overwhelming contribution of > 60 abstracts submitted to our joint Commission 1.1 and 2.1 Session on Soil structure – Observation, resilience and its role in ecosystem functioning. Also on behalf of the chairs of Com. 1.1., Fabio Terribile and Richards Heck, we would like to thank everybody for this great interest and support and hope that we can meet many of you personally in Glasgow.

Publications

In 2021 the Chair and Vice-Chair published 16 journal papers and three book chapters and 5 journal papers in the first half of 2022.

Journal papers

Szabó, B., Weynants, M., and Weber, T. K. D. 2021. Updated European hydraulic pedotransfer functions with communicated uncertainties in the predicted variables (euptfv2). Geosci. Model Dev., 14, 151–175. *https://doi.org/10.5194/gmd-14-151-2021*.

Nasta, P., ***Szabó, B.***, Romano, N. 2021. Evaluation of pedotransfer functions for predicting soil hydraulic properties: A voyage from regional to field scales across Europe. Journal of Hydrology: Regional Studies, 37, 100903. *https://doi.org/10.1016/j.ejrh.2021.100903*.

Zhang, L., Zeng, Y., Zhuang, R., ***Szabó, B.***, Manfreda, S., Han, Q. & Su, Z. 2021. In Situ Observation-Constrained Global Surface Soil Moisture Using Random Forest Model. Remote Sensing, 13, 4893, *https://doi.org/10.3390/rs13234893*.

Fodor, N., Pásztor, L., ***Szabó, B.***, Laborczi, A., Pokovai, K., Hidy, D., Hollós, R., Kristóf, E., Kis, A., Dobor, L., Kern, A., Grünwald, T. & Barcza, Z. 2021. Input database related uncertainty of Biome-BGCMuSo agro-environmental model outputs. International Journal of Digital Earth, 1–20. *https://doi.org/10.1080/17538947.2021.1953161*.

Francos, N., Romano, N., Nasta, P., Zeng, Y., ***Szabó, B.***, Manfreda, S., Ciraolo, G., Mészáros, J., Zhuang, R., Su, B. & Ben-Dor, E. 2021. Mapping Water Infiltration Rate Using Ground and UAV Hyperspectral Data: A Case Study of Alento, Italy. Remote Sensing, 13, 2606. *https://doi.org/10.3390/rs13132606*.

Pessoa, T.N., Cooper, M., Nunes, M.R., Uteau, D., ***Peth, S***., Vaz, C.M.P., Libardi, P.L. 2022.2D and 3D techniques to assess the structure and porosity of Oxisols and their correlations with other soil properties, Catena, 210, *https://doi.org/10.1016/j.catena.2021.105899*.

Bucka, F.B., Felde, V.J.M.N.L., ***Peth, S.***, Kögel-Knabner, I. 2021. Disentangling the effects of OM quality and soil texture on microbially mediated structure formation in artificial model soils, Geoderma, 403, *https://doi.org/10.1016/j.geoderma.2021.115213*.

Blagodatskaya, E., Tarkka, M., Knief, C., Koller, R., ***Peth, S.***, Schmidt, V., Spielvogel, S., Uteau, D., Weber, M., Razavi, B.S. 2021. Bridging Microbial Functional Traits With Localized Process Rates at Soil Interfaces, Frontiers in Microbiology, 12, *https://doi.org/10.3389/fmicb.2021.625697*.

Pohl, L., Kölbl, A., Uteau, D., ***Peth, S.***, Häusler, W., Mosley, L., Marschner, P., Fitzpatrick, R., Kögel-Knabner, I. 2021. Porosity and organic matter distribution in jarositic phyto tubules of sulfuric soils assessed by combined µCT and NanoSIMS analysis(2021) Geoderma, 399, *https://doi.org/10.1016/j.geoderma.2021.115124*.

Dec, D., Bravo, S., Horn, R., Uteau, D., ***Peth, S.***, Zúñiga, F., Clunes, J., Granda, S., Martínez, Ó., Balocchi, Ó., Alonso, M., Dörner, J. 2021Analyzing the impact of grazing and short-term irrigation management on soil mechanical strength of a volcanic ash soil under different types of pastures, Soil and Tillage Research, 213, *https://doi.org/10.1016/j.still.2021.105130*.

Felde, V.J.M.N.L., Schweizer, S.A., Biesgen, D., Ulbrich, A., Uteau, D., Knief, C., Graf-Rosenfellner, M., Kögel-Knabner, I., ***Peth, S.*** 2021. Wet sieving versus dry crushing: Soil microaggregates reveal different physical structure, bacterial diversity and organic matter composition in a clay gradient, European Journal of Soil Science, 72 (2), pp. 810-828. *https://doi.org/10.1111/ejss.13014*.

Koppe, E., Rupollo, C.Z., de Queiroz, R., Uteau Puschmann, D., ***Peth, S.***, Reinert, D. 2021.Physical recovery of an oxisol subjected to four intensities of dairy cattle grazing, Soil and Tillage Research, 206, *https://doi.org/10.1016/j.still.2020.104813*.

Rosskopf, U., Uteau, D., ***Peth, S.*** 2021. Effects of mucilage concentration at different water contents on mechanical stability and elasticity in a loamy and a sandy soil, European Journal of Soil Science, *https://doi.org/10.1111/ejss.13189*.

Dorau, K., Uteau, D., Hövels, M.P., ***Peth, S.***, Mansfeldt, T. 2021. Soil aeration and redox potential as function of pore connectivity unravelled by X-ray microtomography imaging(2021) European Journal of Soil Science, *https://doi.org/10.1111/ejss.13165*.

Fritz, J., Lauer, F., Wilkening, A., Masson, P., ***Peth, S.*** 2021. Aggregate stability and visual evaluation of soil structure in biodynamic cultivation of Burgundy vineyard soils, Biological Agriculture and Horticulture, 37 (3), pp. 168-182. *https://doi.org/10.1080/01448765.2021.1929480*.

Bilibio, C., Hensel, O., Uteau, D., ***Peth, S.*** 2021. Simulation of evapotranspiration and drainage from potash tailings covers using hydrus-1d, Agricultural Engineering International: CIGR Journal, 23 (2), pp. 85-98.

Book chapters

Barão, L., Alaoui, A., Ferreira, C., Basch, G., Schwilch, G., Geissen, V., Sukkel, W., Lemesle, J., Garcia-Orenes, F., Morugán-Coronado, A., Mataix-Solera, J., Kosmas, C., Glavan, M., Pintar, M., ***Szabó, B.***, Hermann, T., Vizitiu, O.P., Lipiec, J., Reintam, E., Xu, M., Di, J., Fan, H. & Wang, F. 2021. Promising agricultural management practices and soilthreats in Europe and China. In: Exploring and Optimizing Agricultural Landscapes (eds. Eulenstein, F., Dronin, N.M., Sychev, V.G. & Mueller, L.), pp. 195-213. Springer International Publishing. *https://doi.org/10.1007/978-3-030-67448-9_7*.

Almawazreh, A., Uteau, D., Buerkert, A., Sathish, A., Mudalagiriyappa, Hanumanthappa, D.C., Subbarayappa, C.T., ***Peth, S.*** 2021. Effects of Soil Management Practices on Soil Physical Properties and Water Cycle in a Multifactorial Field Experiment, Urban Book Series, pp. 85-94. *https://doi.org/10.1007/978-3-030-79972-4_8*.

Buerkert, A., Hoffmann, E., Suddapuli Hewage, R., Goenster-Jordan, S., Sourav, S.K., Mock, A., Vazhacharickal, P.J., Subbarayappa, C.T., Mudalagiriyappa, Hanumanthappa, D.C., ***Peth, S.***, Wachendorf, M. 2021. Crop Production Under Urbanisation: An Experimental Approach to Understand and Model Agricultural Intensification, Urban Book Series, pp. 71-83. *https://doi.org/10.1007/978-3-030-79972-4_7*.

Commission 2.2 – Soil Chemistry

Chair: Boris Jansen, Netherlands
Vice Chair: Karen Vancampenhout, Belgium
Soil Chemistry deals with the chemical composition, chemical properties, and chemical reactions of soils. Major research thrusts include: application of molecular scale in-situ techniques to elucidate aqueous and surface chemical speciation and mechanisms, kinetics of soil chemical phenomena; rhizosphere chemistry; organic matter structure; and soil chemical modeling.

Events

- 8-9 April 2021 NACGeo conference (online).
- 23 April 2021 Webinar of the Dutch Soil Science Society on soil communication.
- 23-27 August 2021 Eurosoil conference (online).

Recent activities

The Chair of the Commission convened a Soil Science session at the NACGeo conference that was held online. Furthermore, the Chair and Vice-Chair of the Commission jointly convened a session titled "From source to storage – understanding soil organic matter cycling in space and time using molecular tools" at the Eurosoil 2021 conference that was held online due to COVID-19 related restrictions. At the same conference, the Chair and Vice-Chair organized and contributed to a session and panel discussion on teaching, outreach and stakeholder involvement in soil sciences in general, including soil chemistry.
Outreach activities of the Commission include webinars (such as the webinar on soil communication of the Dutch Soil Science Society). Furthermore, the Chair and Vice-Chair of the Commission have been actively promoting soil chemistry via posts on Twitter, Facebook and Instagram. Moreover, the Vice-Chair participated in policy support (the Belgian 'Soil as Natural Capital' policy discussions and brief, the Flemish 'Soil Stewardship' en 'Grond+Zaken' networks and the Flemish policy brief on soil nutrients) and currently leads actions on soil carbon sequestration in two Horizon2020 projects with strong outreach and capacity building components.
The Commission Chair and Vice-Chair organized and hosted a scientific session titled: "Biomarkers – the tool to trace recycling and fate of organic carbon and other elements in soil" at the EGU General Assembly in Vienna on 24 May 2022.

Planned future activities

The Commission is now strongly involved in the preparation of the organization of the World Conference of Soil Science to be held in Glasgow, UK in 2022, including organizing and convening dedicated sessions on soil chemistry as well as an interdivisional session. In addition, the Chair and Vice-Chair are preparing a book chapter titled "Anthrosols: learning from the past to climate-proof the future" as part of a Special Publication in Soil and Tillage Research by the IUSS Divisions. In July 2022, the Vice-Chair support the International Conference on Climate-Smart solutions for Tropical Mountain Environments, to be held at MWECAU University, Tanzania. The

conference has a sub-theme related to environmental effects of land use change and building resilience through agriculture. In both sub-themes, soil will play a central role. The Chair and Vice-Chair jointly contribute to a session on soil carbon chemistry to be held at the EGU General Assembly in May 2022.
The Soil Science Society of Belgium and The Netherlands plan several thematic days aimed at a large audience and soil education where the Chair and Vice-Chair will contribute.

Publications

In 2021 the Chair and Vice-Chair published 14 peer-reviewed journal articles and 4 peer-reviewed journal articles in the first half of 2022, including:

E. Desie, B. Muys, B. Jansen, L. Vesterdal, ***K. Vancampenhout***, 2021. Pedogenic threshold in acidity explains context-dependent tree species effects on soil carbon, Frontiers in Forests and Global Change, 679813.

X. Jing, B. Muys, H. Bruelheide, E. Desie, S. Hattenschwiler, H. Jactel, B. Jaroszewicz, P. Kardol, S. Ratcliffe, M. Scherer-Lorenzen, F. Selvi, ***K. Vancampenhout***, F. Van der Plas, K. Verheyen, L. Vesterdal, L., J. Zuo and K. Van Meerbeek, 2021. Above- and below-ground complementarity rather than selection drive tree diversity-productivity relationships in European forests. Functional Ecology, 35: 1756-1767.

F. Amery, B. Vandecasteele, I. Delcour, S. Pot, T. Cordaro, J. Debode, J. Tavernier and ***K. Vancampenhou***t, 2021. Nature conservation management residues as alternative for farm yard manure: effects on nutrients, carbon and disease suppression. Acta Horticulturae, 1317, 231-238.

S. Yang, ***B. Jansen***, S. Absalah, K. Kalbitz, F.O. Chunga Castro and E.L.H. Cammeraat, 2022. Soil organic carbon content and mineralization controlled by the composition, origin and molecular diversity of organic matter: A study in tropical alpine grasslands, Soil & Tillage Research, 215: 105203.

The Chair and Vice-Chair also have a review publication on soil organic matter persistence currently in review.

Commission 2.3 – Soil Biology

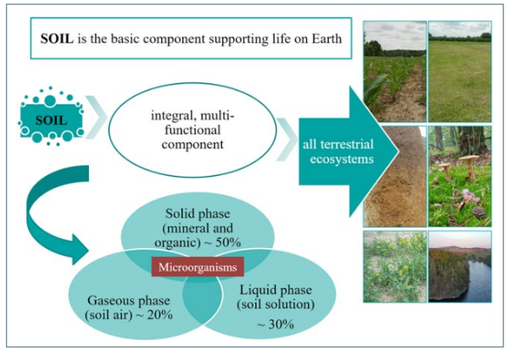
Chair: Ellen Kandeler, Germany
Vice-Chair: Magdalena Frąc, Poland
The commission is dealing with soil as habitats for soil organisms. Soil organisms are important drivers of different ecosystem functions (e.g. mineralisation and aggregation). Commission 2.3. focus on interactions between biotic and abiotic components of soils including responses and adaptation to environmental changes. Commission 2.3. closely cooperate with IUSS units dealing with soil chemistry and soil physics.

Events

- microbioma2 International Congress, *https://microbioma.es/en/program/*, 03-04.11.2021, Cartagena Spain – Prof. Magdalena Frąc (Institute of Agrophysics, Polish Academy of Sciences) was invited as a keynote speaker. In her lecture entitled "New biotechnological solutions for diagnostics, control and monitoring of key fungal pathogens in organic cultivation of soft fruit" she promoted organic farming and underlined the importance of soil quality and health for agroecosystems. She was introduced as the Vice-Chair of the Soil Biology Commission of the International Union of Soil Sciences. She focused on solutions important for sustainable and organic agriculture, which is in line with the assumptions of key EU strategic documents such as the European Green Deal. She also underlined the relevance and assumptions of the Biodiversity Strategy for 2030.

Prof. Magdalena Frąc during her lecture
(© Magdalena Frąc)

- At the seminar via ZOOM platform in the Institute of Plant Genetics Polish Academy of Sciences, Poznań, Poland, 17.12.2021, Magdalena Frąc gave a lecture concerning new biotechnological solutions for diagnostics, control and monitoring of key fungal pathogens in organic cultivation of soft fruits. She focused especially on soil functionality, health, biological properties and processes occurring in the soil environment. She was introduced as researcher of the Institute of Agrophysics, Polish Academy of Sciences, and as Vice-Chair of the Soil Biology Commission of the International Union of Soil Sciences.
- Promotion of Soil Biodiversity and microbiome importance during the meetings (25.06.2021, 15.09.2021, 18.10.2021, 22.11.2021, 20.12.2021) of microbiome Agro Living Lab: *http://microbiome.ipan.lublin.pl/*.
At the scientific level the specific objectives of microBIOme Agro Living Lab are to describe the microbial genetic and functional diversity of soils; evaluate the microbiome and mycobiome of soils and crops, including trophic and functional guilds with determination of pathogenic and antagonistic microorganisms; assess the microbial activity and diversity in soil ecosystem under the influence of different bioproducts; determine the effectiveness of developed bioproducts against the key fungal plant pathogens.
- Participation of M. Frąc in the webinar "Caring for soil is caring for life" – Mission Soil Health and Food in Horizon Europe as an invited expert in the panel concerning organic agriculture. 23.09.2021. During this panel the main goals of the mission, especially challenges for healthy soil and food were discussed. M. Frąc was introduced as professor of agricultural sciences (IA PAS), especially environmental microbiology, and as the Vice-Chair of the Soil Biology Commission of the International Union of Soil Sciences. She underlined the importance of organic farming in the context of food quality and human health, but also in the context of soil quality. Different tools and solutions for organic farming development and soil quality monitoring were discussed and promoted. The importance of biodiversity for soil fertility and sustainable agriculture was presented. She presented and underlined the relevance of microbiome-based solutions for organic and sustainable agriculture, soil quality and health and climate change mitigation. Holobiont conception including soil-plant microbiomes interactions was discussed and promoted.



One slide of Prof. Frąc's presentation (© Magdalena Frąc)

© microbiome Agro Living Lab

Announcement of webinar "Caring for soil is caring for life" (© PolSCA)

Recent activities

- The Chair and Vice-Chair of commission 2.3 proposed two sessions for the World Congress of Soil Science in Glasgow in 2022: (1) session 19: Soil microorganisms under changing environment. 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. Conveners: Ellen Kandeler; Magdalena Frąc; Richard Bardgett and (2) session 20: Soil biology in transition: from descriptive to mechanistical understanding. Conveners: 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. In addition, Boris Jansen (Chair, Commission 2.2), Ellen Kandeler (Chair, Commission 2.3), Curtis Monger (Chair, Commission 1.4) and Pete Smith (University of Aberdeen) are organizing the interdivisional session 2: Soil carbon: From particle to planet. We want to put your attention to the possibility for young scientists to get funding for travelling to the World Congress of Soil Science in Glasgow (2022).
- The Chair of commission 2.3, Ellen Kandeler, is supporting Petr Baldrian, Chair of the Organizing Committee, to prepare the following conference **Ecology of Soil Microorganisms**. IUSS supports this conference by providing Stimulus Funds for young scientists. The 4th conference Ecology of Soil Microorganisms will take place in-person in Prague on June 19-23, 2022. The conference is planned as an interdisciplinary platform that should offer as much interaction among various subjects within microbial ecology as possible. This includes questions addressing individual microbes, microbial communities as well as their interactions with the environment and other soil biota. We aim to link the current molecular "omics" methods such as metagenomics, metatranscriptomics and metaproteomics with approaches based on soil chemical and biochemical analyses, the exploration of soil fauna and plant ecology. The other important goal of the conference is a wide scope covering the ecology of all microbes: bacteria and fungi as well as archaea and protozoa. Our aim is to bring experts from all these disciplines to a meeting where all can benefit from interactions and to promote in this way the research in the field of soil ecology. Please find more information on the conference website *www.soilmicrobes.org* and in the conference flyer. We are looking forward to meet you next June in Prague! (e-mail: *info@soilmicrobes.org*).
- The Vice-Chair made presentations in school concerning soil biodiversity and health in the context of organic farming (08.04.2022).
- The Chair of commission 2.3, Ellen Kandeler, prepared together with different members of the EU Horizon 2020 project SOILCARE a review article about soil biodiversity under different cropping systems which will be published in an IUSS book (reference, please see below).
- Commission 2.3 wants to announce that members strongly support the GLOBAL SOIL BIODIVERSTY INITIATIVE (Dr. Diana Wall, scientific chair, Fort Collins). Highlights of the last year were amazing contributions to the GSBI webinar series "GSBI Speaks" and celebration of soil biodiversity at World Soil Day. For more information see: *info@globalsoilbiodiversity.org*.

Planned future activities

- With the Vice-Chair as a lead author, the members of commission 2.3 are preparing a chapter as a part of a Special Publication in Soil and Tillage Research by the IUSS Divisions: "Soil microbiome as important player in climate changes, soil functioning and plant health" by Magdalena Frąc, Agata Gryta, Wiktoria Maj, Mateusz Mącik, Karolina Oszust, Jacek Panek, Giorgia Pertile, Michał Pylak, Dominika Siegieda, Ryusuke Hatano and Ellen Kandeler.
- Promotion and dissemination of soil biodiversity and microbiome importance for soil quality and health during different events in 2022.

Publications

In 2021 the Chair published 16 journal papers and 15 publications in the first half of 2022 including the following:

Boeddinghaus R.S., Marhan S., Gebala A., Haslwimmer H., Vieira S., Sikroski J., Overmann J., Soares M., Rousk T., ***Kandeler E.*** (2021) The Mineralosphere – Interactive zone of microbial colonization and carbon use in grassland soils. Biology and Fertility of Soils 57, 587-601.

Oehlmann Y., Lange M., Leimer S., Roscher C., Aburto F., Alt F., Dassen S., De Deyn G., Eisenhauer N., Gleixner G., Goldmann K., Hacker N., Hölzel N., Jochum M., ***Kandeler E.***, Klaus V.K., Kleinebecker N., Le Proust G., Manning P., Marhan S., Prati D., Schäfer D., Schöning I., Schrumpf M., Sorkau E., Wagg C., Wubet T., Wilcke W. (2021) Above- and belowground biodiversity jointly tighten the P cycle. Nature Communication, (2021) 12:4431, *https://doi.org/10.1038/s41467-021-24714-4*, *www.nature.com/nature communications*.

Teste F.P., Lambers H., Enowashu E., Laliberté E., Marhan S., ***Kandeler E.*** (2021) Soil microbial communities are driven by the declining availability of cations and phosphorus during ecosystem retrogression. Soil Biology and Biochemistry Volume 163, 108430, *https://doi.org/10.1016/j.soilbio.2021.108430*.

Crotty F., Hannula E., Hallama M., Kandeler E. (2022) Can soil improving cropping systems reduce the loss of soil biodiversity within agricultural soils? In: Reyes-Sánchez L. B., Horn R., Costantini E.A.C.: Sustainable soil management as a key to preserving soil biodiversity and stopping its degradation. International Union of Soil Sciences (IUSS). Vienna, Austria, pp 187-220.

The Vice-Chair published 17 journal papers in 2021 and 7 journal papers in the first half of 2022 including:

Karolina Oszust, ***Magdalena Frąc***, First report on the microbial communities of the wild and planted raspberry rhizosphere – A statement on the taxa, processes and a new indicator of functional diversity – Ecological Indicators, 2021, 121, 107117.

Mateusz Mącik, Agata Gryta, Lidia Sas-Paszt, ***Magdalena Frąc***, Composition, activity and diversity of bacterial and fungal communities responses to inputs of phosphorus fertilizer enriched with beneficial microbes in Brunic Arenosol degraded soil. Land Degradation and Development, First published: 26 December 2021, *https://doi.org/10.1002/ldr.4179*.

Giorgia Pertile, Krzysztof Lamorski, Andrzej Bieganowski, Patrycja Boguta, Małgorzata Brzezińska, Cezary Polakowski, Kamil Skic, Zofia Sokołowska, Piotr Baranowski, Bartłomiej Gackiewicz, Agnieszka Rutkowska, Paweł Trzciński, Lidia Sas-Paszt, ***Magdalena Frąc***, Immediate effects of the application of various fungal strains with urea fertiliser on microbiome structure and functions and their relationships with the physicochemical parameters of two different soil types. Applied Soil Ecology, 2021, 163, 103972, *https://doi.org/10.1016/j.apsoil.2021.103972*.

The following IUSS book chapter was prepared:

Crotty F., Hannula E., Hallama M. and ***Kandeler E***. (2022) Can soil improving cropping systems reduce the loss of soil biodiversity within agricultural soils? in the book "Sustainable soil management as a key to preserve soil biodiversity and stop its degradation". Laura Bertha Reyes-Sánchez, Rainer Horn, and Edoardo A.C. Costantini Eds. IUSS, Vienna, Austria.

Commission 2.4 – Soil Mineralogy

Chair: Stephan Hillier, United Kingdom
Vice-Chair: Sofia N. Lessovaia, Russia

Many functions of soils are related either directly or indirectly to soil mineralogy. The commission on Soil Mineralogy seeks to encourage and support the study, through both research and teaching, of all aspects of the minerals found in soils, and their relationships to and interactions with other soil components, such as organic compounds. Soil minerals may be inherited from parent materials, and they may be transformed and neoformed by processes such as weathering. Knowledge of minerals in the soil environment may inform studies of the genesis and classification of soils as well as their management, behaviour, conservation, and fertility. Studies of soil mineralogy benefit from many advanced instrumental methods applied across nano to landscape scales. The vision of the commission is to promote modern approaches to soil mineralogy, such as data driven approaches, and especially those approaches that seek to advance understanding of the roles of soil minerals in relation to sustaining and enhancing the functions soils.

Events

In 2019 we offered to organize a Session at Eurosoil Conference Geneva, Switzerland. The Conference was postponed from 2020 and in this year we have moderated a session "Linking soil mineralogy to soil properties and functions" (4.27) at the virtual Congress Eurosoil, 23-27 August, 2021). The Session dealt with a wide range of issues including mineral weathering in soil environment and interaction of soil organic matter and minerals.

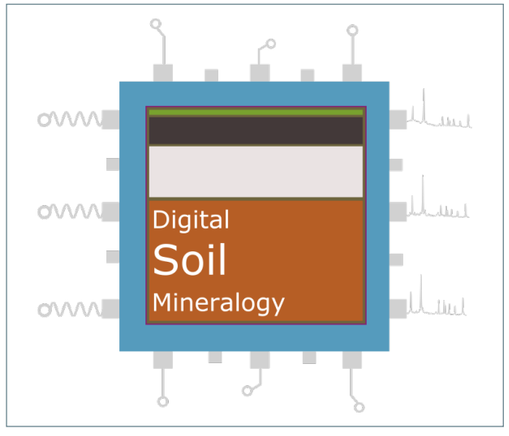
Recent Activities

In 2021 a main agenda of the Soil Mineralogy Commission deals with the role of soil mineralogy in various issues of modern soil science, including fundamental one (first of all – soil genesis) as well as applied such as organo-mineral interactions, soil contamination(s), etc.

Unfortunately, we do not have Commission Session(s) at the 22nd Congress of SS (Glasgow), while we offered two Sessions. But we are glad to know that the Chair of the Commission – Steve Hillier is one of the Chairs of Interdivisional Session (9; Novel methods and techniques").

Planned future activities

We are planning to join the XVII IC Conference (Turkey, Istanbul, July 2022), which was postponed from 2021, participating in two Sessions "The role of clays in critical zone architecture and function" (Chairs Schroeder P.A., Lanson B.), "Soil mineral quantification -from poorly crystalline phases and interstratified soil clay minerals to digital soil mineralogy (Chairs Dietel, J., Dohrmann, R., Georgiadis, A., Hillier, S., Hubert, F., Mikutta, C.).
It is also planned at the World Soil Congress in Glasgow to launch an online course is 'Digital Soil Mineralogy with R'. This free online course has been created with the help of funding to the Chair from the IUSS Stimulus fund. *http://digitalmineralogy.hutton.ac.uk/course/*.



Logo of the Digital Soil Mineralogy Course
(© IUSS Commission 2.4)

Publications

The Chair and Vice-Chair published 7 journal papers in 2021 and 5 journal papers in the first half of 2022 including:

Pogosyan L., Sedov S., Sheinkman V., Yurtaev A., Rusakov A., ***Lessovaia S.N.,*** Pechkin A.S. (2021) Polygenesis of loamy soils in north-west siberia in the context of environmental history of the Eurasian Artic region during the late Quaternary. Quaternary International. *https://doi.org/10.1016/j.quaint.2021.01.013*.

Ganyushkin D.A., ***Lessovaia S.N.***, Vlasov D.Y., Kopitsa G.P., Almásy L., Chistyakov K.V., Panova E.G., Derkach E. (2021) Application of rock weathering and colonization by biota for the relative dating of moraines from the arid part of the Russian Altai mountains. Geosciences, 11, 342.

Desyatkin R.V., ***Lessovaia S.N.***, Okoneshnikova M.V., Ivanova A.Z. (2021) Cryosols from tundra and taiga zones of Yakutia: properties, clay mineralogy, and problems of classification. Eurasian Soil Science, Vol. 54, No. 12, pp. 1783–1794.

Adediran, G. A., D. Lundberg, G. Almkvist, A. E. P. del Real, W. Klysubun, ***S. Hillier***, J. P. Gustafsson, and M. Simonsson, 2021, Micro and nano sized particles in leachates from agricultural soils: Phosphorus and sulfur speciation by X-ray micro-spectroscopy: Water Research, v. 189.

Butler, B. M., and ***S. Hillier***, 2021, Automated full-pattern summation of x-ray powder diffraction data for high-throughput quantification of clay-bearing mixtures: Clays and Clay Minerals, v. 69, p. 38-51.

Butler, B. M., and ***S. Hillier***, 2021, powdR: An R package for quantitative mineralogy using full pattern summation of X-ray powder diffraction data: Computers & Geosciences, v. 147.

Day-Stirrat, R. J., ***S. Hillier***, A. Nikitin, R. Hofmann, R. Mahood, and G. Mertens, 2021, Natural gamma-ray spectroscopy (NGS) as a proxy for the distribution of clay minerals and bitumen in the Cretaceous McMurray Formation, Alberta, Canada: Fuel, v. 288.

Tuyishime, J. R. M., G. A. Adediran, B. A. Olsson, M. Spohn, ***S. Hillier***, W. Klysubun, and J. P. Gustafsson, 2022, Phosphorus abundance and speciation in acid forest Podzols – Effect of postglacial weathering: Geoderma, v. 406.

Vasilopanagos, C.; Carteret, C.; Hillier, S.; Neumann, A.; Brooksbank, H.J.L.; Greenwell, H.C. 2022 Effect of Structural Fe Reduction on Water Sorption by Swelling and Non-Swelling Clay Minerals. Minerals, 12, 453.

Keskinen, R., Hillier, S., Liski, E., Nuutinen, V., Nyambura, M., & Tiljander Mia (2022) Mineral composition and its relations to readily available element concentrations in cultivated soils of Finland, Acta Agriculturae Scandinavica, Section B – Soil & Plant Science, 72:1, 751-760.

Ramage, S.J.F.F. Pagaling, E. Haghi R.K., Dawson L.A., Yates K., Prabhu R., Hillier S., Devalla S. (2022) Rapid extraction of high- and low-density microplastics from soil using high-gradient magnetic separation. Sci. Total Environ., 831 (2022), Article 154912.

Kust P.G., Makeev A.O., Lessovaia S., Milanovsky E., Rusakov A., Abrosimov K.N., Belyaev V., Ryazantsev P. (2022) Polygenetic features in Retisols, formed in Moscow (late Saalian) glacial till. Catena. 2022. V. 214. P. 106245. 10.1016/j.catena.2022.106245.

Commission 2.5 – Soil Chemical, Physical and Biological Interfacial Reactions

Chair: Siobhan Staunton, France
Vice-Chair: Qiaoyun Huang, China
The Commission deals with abiotic and biotic interactive processes occurring in soil with the goal of advancing the understanding on physical/chemical/biological interfacial systems at the molecular to field/landscape levels. Major research thrusts include: (1) mineral and biological catalysis and enzyme-mineral interactions leading to humus and organo-mineral complex formation, (2) surface reactions of micro- and macro-biota and biomolecules with soil particles, (3) the effect of soil abiotic and biotic interactive processes on the structure, dynamics, and activities of microbial communities, and (4) ecological impacts of soil abiotic and biotic interactive processes on (a) porosity formation by structure or organization development and on (b) biogeochemical transformation and transport of chemical and biological components at different spatial and temporal scales.

Recent Activities

May 2021 saw the publication of a special issue of European Journal of Soil Science (Vol 72, No 3) containing a selection of contributions made at the 8th ISMOM conference held in Seville in 2021. In all fourteen papers were published and each of the six sessions of ISMOM were represented. The special issue was introduced with an editorial by Heike Knicker, IRNAS-CSIC, Conference Chair and Siobhan Staunton, INRAE, Commission Chair.

Planned future activities

The subject of the next ISMOM has been under discussion throughout the year. The 9th ISMOM will be held in Japan, and the organizing committee is chaired by Rota Wagai (National Agriculture & Food Research Organization). Because of the ongoing uncertainties about international travel restrictions, the conference will be held in 2024, mid-way between the 22nd and 23rd WCSS.
This was announced in a message to the Commission mailing list. Anyone who wishes their address to be added to this mailing list is invited to contact Siobhan Staunton (*Siobhan.staunton@inrae.fr*).

Publications

In 2021 the Chair published four journal papers.

Luis Merino-Martín, Alexia Stokes, Hyun S. Gweon, Lur Moragues-Saitua, ***Siobhan Staunton***, Claude Plassard, Anna Oliver, Yves Le Bissonnais, Robert I. Griffiths. Interacting effects of land use type, microbes and plant traits on soil aggregate stability. Soil Biology and Biochemistry,154, 2021, 108072. *https://doi.org/10.1016/j.soilbio.2020.108072*.

Heike Knicker, ***Siobhan Staunton***. Editorial for the special issue on "Understanding soil interfacial reactions for sustainable soil management and climatic change mitigation" (ISMOM 2019). European Journal of Soil Science, 72 (3), 1079-1082, 2021. DOI:10.1111/ejss.13114.

Gaoussou Cissé, Folkert van Oort, Claire Chenu, Marc Essi, ***Siobhan Staunton***. Is the operationally defined fraction of soil organic matter, "GRSP" (glomalin-related soil protein), stable in soils? Evidence from trends in long-term bare fallow soil. European Journal of Soil Science, 72 (3), 1101-1112, 2021. DOI:10.1111/ejss.12974.

Cecilia Paredes, ***Siobhan Staunton***, Paola Duran, Rodrigo Rodríguez, María de la Luz Mora. Assessment of the combined effects of beef cattle manure and lemon peel waste on soil-plant biochemical properties and phosphorus uptake by ryegrass. Applied Soil Ecology 169, 2022, 104217. *https://doi.org/10.1016/j.apsoil.2021.104217*.

The Vice-Chair published 41 journal papers in 2021 and 17 journal papers in the first half of 2022, including the following:

Shun Han, Shuang Tan, Achen Wang, Wenli Chen, ***Qiaoyun Huang***. Bacterial rather than fungal diversity and community assembly drive soil multifunctionality in a subtropical forest ecosystem. Environmental Microbiology Reports, 14, 2021, 85-95. DOI: 10.1111/1758-2229.13033.

Xiang Li, Achen Wang, Wenjie Wan, Xuesong Luo, Liuxia Zheng, Guangwen He, Daqing Huang, Wenli Chen, ***Qiaoyun Huang***. High Salinity Inhibits Soil Bacterial Community Mediating Nitrogen Cycling. Applied and Environmental Microbiology, 87(21), 2021, e0136621. DOI: 10.1128/AEM.01366-21.

Chenchen Qu, Jeremy B. Fein, Wenli Chen, Mingkai Ma, Peng Cai, ***Qiaoyun Huang***. Mechanistic investigation and modeling of Cd immobilization by iron (hydr) oxide-humic acid coprecipitates. Journal of Hazardous Materials, 420, 2021, 126603. DOI: 10.1016/J.JHAZMAT.2021.126603.

Xuesong Luo, Luyang Zeng, Li Wang, Hang Qian, Chunli Hou, Shilin Wen, Boren Wang, ***Qiaoyun Huang***, Wenli Chen. Abundance for subgroups of denitrifiers in soil aggregates asscociates with denitrifying enzyme activities under different fertilization regimes. Applied Soil Ecology, 166, 2021, 103983. DOI: 10.1016/J.APSOIL.2021.103983.

Hao Liao, Shenghan Gao, Xiuli Hao, Fei Qin, Silin Ma, Wenli Chen, ***Qiaoyun Huang***. Soil aggregate isolation method affects interpretation of protistan community. Soil Biology and Biochemistry, 161, 2021, 108388. DOI: 10.1016/J.SOILBIO.2021.108388.

Working Group Global Hydropedology

Chair: Hans-Jörg Vogel, Germany
Vice-Chair: Johan van Tol, South Africa

Hydropedology is a specific, powerful and widely acknowledged scientific approach at the interface between soil hydrology and pedology which justifies a WG at the level of IUSS. Pedological processes are shaping subsurface structures that are of critical importance for water dynamics within soil and terrestrial systems. Vice versa, water dynamics is shaping pedogenetic processes significantly through transport of solutes and solid materials. Hence, there are close interactions between soil hydrology and pedology that are explored within the framework of hydropedology for a better understanding of soil functions. This is true at the scale of pedons but also at the landscape scale where the spatial patterns of soils determine the storage capacities and flow paths of water and the entrained substances.

Recent activities

The working group started into 2021 under the new/old flag of "Hydropedology" after renaming the working group from "Critical Zone System". This was the result of intense discussion among the peers through virtual meetings in 2020. The focus in 2021 was on the preparation of the next international conference of Hydropedology to revive the community. In the WCSS, the working group will open the session "36. WG2.1 The Legacy of Henry Lin and the future of Hydropedology".

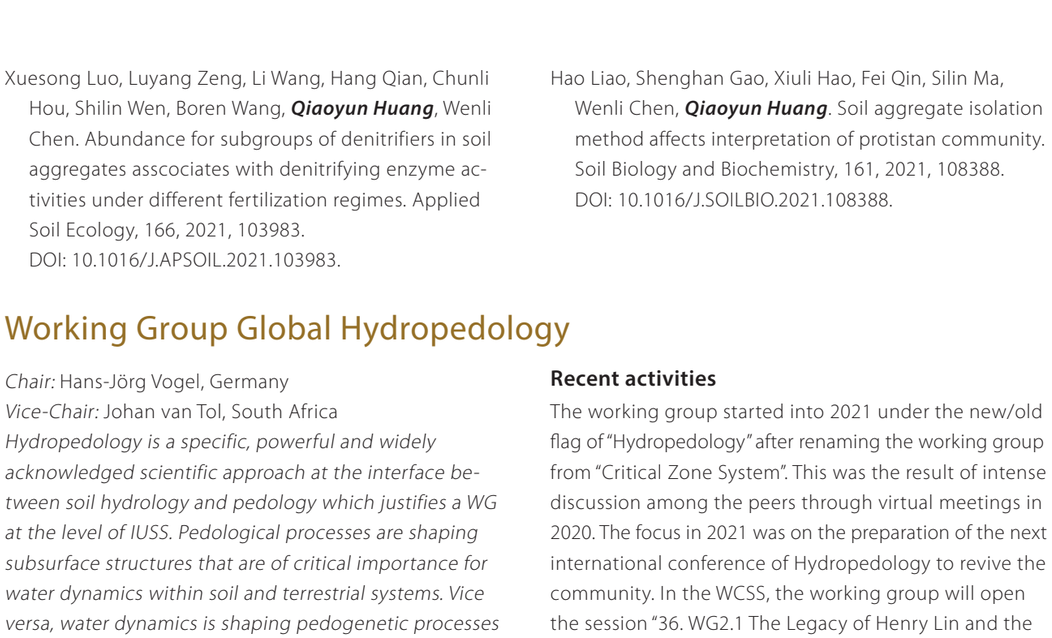
Planned future activities

We are pleased that this 4th International Conference on Hydropedology will now take place from 23-26 August 2022 in Skukuza, South Africa. This is back-to-back with the Kirkham Conference taking place one week later at the same place. During this conference we will address the currently burning issues related to climate and land use change where the research field of hydropedology can provide substantial input:

- soil water as a key to soil functions and soil health
- Catchment structures, soilscapes, and quantitative pedogenesis
- Structure-function relationships at the pedon scale and beyond
- Soil water, matter and energy fluxes – including hydrological extremes
- Multiscale modelling of hydrologic systems
- Hydropedology in environmental policy
- Digital soil mapping and hydropedology

Johan Bouma and Jeffrey McDonnell will be the keynote speakers for the conference.

There will also be a dedicated session on hydropedology at the 22nd World Congress of Soil Science. Oral and poster submissions were evaluated and we are looking forward to lively discussion in this session with the title "The legacy of Lin and the future of hydropedology". The COVID pandemic had negative impacts on networking opportunities as there was no chance to meet physically at conferences, workshops, seminars etc. We sincerely hope that this will change now in 2022.



Announcement of the 4th International Conference on Hydropedology (© Johan van Tol and UFS)

Publications

The Chair and Vice-Chair published 10 journal papers in 2021 and 5 journal papers in the first half of 2022, including the following:

Baveye, P. C., Balseiro-Romero, M., Bottinelli, N., Briones, M., Capowiez, Y., Garnier, P., Kravchenko, A, Otten, W., Pot, V., Schlüter, S., and ***Vogel, H.-J.*** (2022). Lessons from a landmark 1991 article on soil structure: distinct precedence of non-destructive assessment and benefits of fresh perspectives in soil research. Soil Research.

Vogel, H.-J., Balseiro-Romero, M., Kravchenko, A., Otten, W., Pot, V., Schlüter, S., Weller, U and Baveye, P. C. (2022). A holistic pers5pective on soil architecture is needed as a key to soil functions. European Journal of Soil Science, 73(1), e13152.

Baveye, P.C., Dominati, E., Grêt-Regamey, A., and ***Vogel, H.-J,*** 2021: Editorial: Assessment and Modelling of Soil Functions or Soil-Based Ecosystem Services: Theory and Applications to Practical Problems. Front. Environ. Sci. 9, 549, doi:10.3389/fenvs.2021.797933.

Weller, U., Albrecht, L., Schlüter, S. and ***Vogel, H.-J,*** 2021: An Open Soil StructureLibrary based on X-ray CT data, SOIL Discussions, 10.5194/soil-2021-96.

Metreveli, G., Kurtz, S., Rosenfeldt, R.R., Seitz, F., Kumahor, S.K., Grün, A., Klitzke, S., ***Vogel, H.-J.***, Bundschuh, M., Baumann, T., Schulz, R., Manz, W., Lang, F., Schaumann, G.E., (2021): Distribution of engineered Ag nanoparticles in the aquatic-terrestrial transition zone: a long-term indoor floodplain mesocosm study Environ. Sci.-Nano, 8 (6), 1771-1785, DOI: 10.1039/d1en00093d.

Eisenhauer, N., Buscot, F., Heintz-Buschart, A.,Jurburg, S. D., Küsel, K, Sikorski, J., ***Vogel, H.-J.***, Guerra, A. C. (2021): The multidimensionality of soil macroecology. Global Ecol Biogeogr. 30(1), art 6125 *https://doi.org/10.1111/geb.13211*.

Lucas, M., Vetterlein, D., ***Vogel, H.-J.***, Schlüter, S., 2021: Revealing pore connectivity across scales and resolutions with X-ray CT, Europ. J. Soil Sci., 72 (2), 546-560.

Martín, M. A., San José Martínez, F., Giráldez, J. V., Pachepsky, Y., ***Vogel, H. J.***, 2021: Editorial for the Special Issue on `Advances in soil scaling: theories, techniques and applications'. Europ. J. Soil Sci., 72 (2), 491-494, *https://doi.org/10.1111/ejss.13063*.

Mamera, M., ***van Tol, J.J.***, Aghoghovwia, M.P., Nhantumbo, A.B.J.C., Chabala, L.M., Cambule, A., Chalwe, H., Mufume, J.C., Rafael, R.B.A. Potential Use of Biochar in Pit Latrines as a Faecal Sludge Management Strategy to Reduce Water Resource Contaminations: A Review. Appl. Sci. 2021, 11, 11772. *https://doi.org/10.3390/app112411772*.

Clark, V.R., Mukwada, G., Hansen, M., Adelabu, S., Magaiza, G., Le Roux, A., Bredenhand, E., Otomo, P.V., Steenhuisen, S., Franke, A., ***van Tol, J.***, Mathinya, N. & Makombe, R., 2021. The Afronontaine Research Unit: Driving connections and capacity building for the sustainable development of Southern African Mountains. Mountain Research and Development. 42, 1-5. doi.org/10.1659/MRD-JOURNAL-D-21-00038.

Van Tol, J.J., Bieger, K. & Arnold, G., 2021. A Hydropedological approach to simulate streamflow and soil water contents with SWAT+. Hydrological Processes. DOI:10.1002/hyp.14242.

Seboko, K.R., Kotze, E., ***van Tol, J.J.*** & van Zijl, G.M., 2021. Characterization of Soil Carbon Stocks in the City of Johannesburg. Land, 10, 83. *https://doi.org/10.3390/land10010083*.

Working Group Global International Soil Modeling Consortium

Contact person: Martine van der Ploeg, The Netherlands
Vice-Chair: Teamrat Ghezzehei, USA
*The **IUSS Working Group International Soil Modeling Consortium (WG ISMC)** was established in 2016 with the aim to integrate and advance soil systems modeling, data collection, and observational capabilities. The underlying principles and scientific basis were outlined in a recent white paper on "Modeling soil processes: review, challenges and new perspectives" published in Vadose Zone Journal in 2016. Its activities are organized into three science panels: data and observation model linking, soil modeling development and intercomparison, and cross cutting and outreach activities. WG ISMC has an executive board and a scientific advisory board that guides WG ISMC in pursuing its objectives. WG ISMC is a community effort based on voluntary contributions. Everyone can sign up freely under http://eepurl.com/hjZvnX.*
For membership, fill in the Membership Form: https://soil-modeling.org/about/membership.

Events

The **3rd ISMC Conference – Advances in Modeling Soil Systems** was held online from May 18-22, 2021. The conference programme addresses recent research in the soil-vegetation-atmosphere continuum centred around soils over all spatial scales, time scales, and elements – from processes to prediction. Conference goals of 1) Engagement during scientific sessions 2) Active interaction and discussions and 3) Excellent oral talks and poster presentations will be achieved within ten scientific sessions from soil processes in Earth system models, soil formation, soil and plant interaction, transport processes, scaling of biogeochemical models, runoff and erosion, landscape heterogeneity, soil functions, biogeochemical fluxes and soil organic carbon dynamics, and a big data session. During the conference the ISMC 2021 Awards were presented.

Awards

ISMC Award Winners 2021

The biennial Rien van Genuchten Award is issued for outstanding contributions to the understanding of flow and transport processes in soils. It is dedicated to recognizing outstanding scientific achievements made by well-established researchers in the field of soil and vadose zone sciences. The ISMC Executive Board thanks the four anonymous reviewers for carrying out the review process on this year's nominations.

This year's Rien van Genuchten Award goes to Prof. Tiina Roose (photo a), University of Southampton. The award was made on the basis of Prof. Roose's significant contributions to advancing understanding of plant-soil interactions by combining theory, computational modeling, and experimentation. In particular, her work on plant-soil systems extends from fundamental theory to practical application. A further reason for her receiving the award was the fact that her scientific contributions are broad and innovative. The broad application here is the extension of her work to the field of biophysics, modeling such phenomena as the growth of tumours. The innovative technique being applying her mathematical skills and insights to advance a fundamental understanding of the plant-soil-microbiome continuum.

The **ISMC Early Career Award** recognizes outstanding scientific achievements made by early career researchers in the field of soil and vadose zone sciences. This year's ISMC Early Career Award goes to two candidates who received equal scores during review: Morteza Sadeghi, California Environmental Protection Agency, and Ryan Stewart, Virginia Tech.

Dr. Morteza Sadeghi (photo b) **receives the ISMC Early Career Award** on the basis of his work on bridging the gap between traditional soil physics and terrestrial remote sensing. His work has been particularly interdisciplinary and bridging across scales to better capture and understand hydro-terrestrial processes. This is exactly what is needed from the next generation hydro-terrestrial scientists to advance the field.

Photo (from left to right):
a) Prof. T. Roose, winner of the Rien van Genuchten Award 2021 (© Prof. Tiina Roose),
b) Dr. M. Sadeghi (© Dr. Morteza Sadeghi) and
c) Dr. R. Stewart, winners of the ISMC Early Career Award 2021 (© Dr. Ryan Stewart)

Dr. Ryan Stewart (photo c) **receives the ISMC Early Career Award** on the basis of his work in the area of environmental quality and "soil health" with emphasis on water, solute and gas transport in soils. In particular, Dr. Stewart has helped the concept of soil health and made it "a quantitative sub-discipline of soil science". This is significant as it requires a holistic systems perspective in which the complexities of physical, chemical, biological, ecological processes have to be treated as a whole. In our opinion, this set Ryan apart as a leader in this important sub-field.

ISMC Publication Award 2020

"ISMC Publication Award" is to honour the outstanding paper that will likely make a significant impact in soil systems modeling, consistent with the mission of ISMC. For the Year 2020, the ISMC publication award goes to: Carminati, A. and Javaux, M.: Soil Rather Than Xylem Vulnerability Controls Stomatal Response to Drought, Trends Plant Sci., 25(9), 868-880, doi:*10.1016/j.tplants.2020.04.003*, 2020. Congratulations to Prof. Dr. Andrea Carminati (ETH Zürich) and Prof. Dr. Mathieu Javaux (Université catholique de Louvain) for this great achievement!

ISMC Presentation Awards

There have been many outstanding presentations throughout the conference. Out of these, following persons receive the Early Career ISMC Presentation Award for their performance at the ISMC Conference:

Katherine Williams for her presentation, which was in particular special as it suited a broader audience, was excellently prepared and presented: "*Modelling the effects of fertiliser solubility and soil buffer power on phosphorus uptake by spring wheat using an image-based approach*".

Hong Zhao for her presentation, which was on a particular challenging and well presented topic covering in-situ measurements, with soil modelling and remote sensing: "*Retrieving Soil Physical Properties via Assimilating SMAP Brightness Temperature Observations in the Community Land Model*".

MariaLaura Bancheri for her presentation which conveyed a particularly challenging work combining statistical models and physical principles for large scale applications: "*The extended transfer function model for the simulation of pesticides transport along the unsaturated zone*".

Jose Padarian for his presentation which covered many aspects of machine learning and was particularly inspiring: "*Deep neural networks: a flexible framework for soil modelling*".

Feng Tao for his presentation which covered challenging aspects on deep learning to advance process based modeling of soil organic carbon stock at global scale: "*5(PRODA) uncovers key mechanisms underlying global soil carbon storage*".

Songbai Wu for his presentation, which was particularly suited for a broader audience, and covering several interesting aspects on model development for hill slope erosion processes and hydraulic lab experiments: "*Modeling soil erosion with evolving rills on hillslopes*".

Planned future activities

Summer School 2022 Modeling Water Transport in the Soil-Plant System.

The 1st International Summer school on advanced soil physics "**Modeling Water Transport in the Soil-Plant System'**' will be held at UCLouvain, Belgium, from 22nd to 26th August 2022. This one-week intensive summer school aims at offering participants an overview of physical and biological principles, theory and modelling approaches of the soil-plant hydraulics. A combination of theory and practical sessions will provide participants with the bases to understand and simulate soil-plant water transport.

The main topics of the summer school are

- Understanding and determining root and soil hydraulic properties.
- Modeling root water uptake: processes, principles and applications.
- Overview of current hydraulic and simplified modelling approaches (R-SWMS, MECHA, CPLANTBOX, MARSHAL ...) for root water uptake and transpiration flux.

In WCSS 2022, the working group will open WG2.2 Modelling soil processes from pedon to global scale.

Further working group news

The **working group 'Pedotransfer functions and land surface parameterization'** aims to bring together international experts working on pedotransfer functions and land surface parametrization in different disciplines such as soil sciences, climate, and crop modelling. Hereby, the focus will be in a first step on pedotransfer functions (PTF) to estimate soil hydraulic parameters. In addition, also thermal and biogeochemical pedotransfer functions will be tackled. Within the working group urgent needs in pedotransfer and land surface parameterization development and validation will be identified. Full details of the WG aims are shown here *https://soil-modeling.org/science-panels/.../pedotransfer-functions-and-land-surface-parameterization-1/aims-of-the-ptf-working-group*.

The **Soil thermal properties working group** aims to collate and generate **global datasets of measured thermal property data (laboratory and field), conditions** during the experiments (including soil moisture content and temperature, and ideally matric potential), and sample/field **soil properties** (texture, OM, mineralogy (if available), stoniness);

1. to collate and test (using measured thermal property data, as mentioned above) existing, and design and test improved **equations of thermal soil properties**, that can be used in **land surface models,** at field to global scales;
2. to **link thermal theories with hydraulic theories**, and to move away from empirical approaches where possible;
3. to generate **global datasets** of **parameters** required in existing and proposed equations, based on soil texture, OM, **as well as mineralogy and rock content, or proxies thereof**;
4. to generate datasets of **field-site driving data** and **thermal regime verification variables** (soil temperature, soil moisture/matric potential, soil heat flux) for testing of the equations at the field-scale (this includes FLUXNET-style sites, where these data are available).

The **Global soil carbon modeling working group** is working on estimation of potential soil carbon storage based on global available data sets.

The **Biophysics and soil structure working group** held a webinar beginning 2022. Soil structure as biological habitat is one of the themes of this ISMC Working Group, and will form the topic of our first webinar. We hope to attract a broad range of researchers, extending the reach of the ISMC to soil microbiologists and ecologists.

Soil structure forms the habitat of soil organisms and, thus, it is an obvious assumption that soil structure forms variably connected pore spaces and separated niches (i.e. habitats) that are of critical importance for the diversity of soil biota. This affects not only the genetic diversity of individual species, but more importantly the functional diversity within biological communities. Soil biology may also drive soil structure, possibly building favourable properties. The quantitative description of these interactions is weak, but a huge potential exists to learn more by exploiting new technologies and modelling.

GEWEX-ISMC SoilWat Initiative

SoilWat seeks to enhance the representation of soil processes in climate models (Zeng et al. 2021), and currently focuses on soil properties and parameters, soil physical processes (e.g., infiltration, surface evaporation, water and heat flow), soil-root hydraulics, soil-groundwater dynamics, and soil-water/energy/carbon cycles.

- For soil properties and parameters, it is evident that using different Pedotransfer Functions (PTFs) will lead to a considerable range of uncertainties in land surface fluxes (Weihermüller et al. 2021). SoilWat is therefore calling for the harmonization of soil hydro-thermal properties and their PTFs as used in land surface models, which will facilitate understanding uncertainties originating from different model structures and physics. Within SoilWat, the Soil Parameter Model intercomparison Project (SP-MP) aims to assess the influence of soil parameters on the diverse behaviour of LSM (Gudmundsson and Cuntz 2016).
- Soil physical processes are highly impacted by soil structural effects, which modify the long-term hydrologic partitioning between relatively slow deep percolation and fast surface runoff (Vereecken et al. 2019; Fatichi et al. 2020). Structure-corrected soil hydraulic properties can be developed via establishing a functional relationship between vegetation information (as surrogates of soil structure) and soil hydraulic properties (Bonetti, Wei, and Or 2021).
- Soil-root hydraulics play an important role in controlling stomatal conductance and transpiration (Vanderborght et al. 2021). A working group is putting efforts in benchmarking functional-structural root architecture models to evaluate how certain representations of root architecture and model approximations influence simulated root water uptake (Schnepf et al. 2020).
- Considering soil-groundwater dynamics in LSMs to enable investigations of the water cycle 'from bedrock to atmosphere' is still very challenging. It requires a multiscale hydrogeological model (providing hydrologic parameters for groundwater modelling), groundwater observation platform, and groundwater flow model to capture 3D flow in the subsurface at multiple scales and resolutions (Condon et al. 2021).
- Via coupling a soil model with a vegetation model and a radiative transfer model, one will be able to link soil processes to remotely sensed canopy level photosynthesis and solar-induced fluorescence (SIF) (Wang et al. 2021), at the regional to global scale. With the rapid development of SIF remote sensing and datasets, it would be worthwhile to consider a Soil-SIF WG for studying the soil-water/energy/carbon cycles.

References

Bonetti, Sara, Zhongwang Wei, and Dani Or. 2021. "A Framework for Quantifying Hydrologic Effects of Soil Structure across Scales." Communications Earth & Environment 2021 2:1 2 (1): 1–10. *https://doi.org/10.1038/s43247-021-00180-0*.

Condon, L.E., S. Kollet, M.F.P. Bierkens, G.E. Fogg, R.M. Maxwell, M.C. Hill, A. Verhoef, A.F. Van Loon, M. Sulis, and C. Hendricks Fransen, H.J. Abesser. 2021. "Global Groundwater Modeling and Monitoring: Opportunities and Challenges." Water Resources Research, in press.

Fatichi, Simone, Dani Or, Robert Walko, Harry Vereecken, Michael H. Young, Teamrat A. Ghezzehei, Tomislav Hengl, Stefan Kollet, Nurit Agam, and Roni Avissar. 2020. "Soil Structure Is an Important Omission in Earth System Models." Nature Communications 11 (1): 1–11. *https://doi.org/10.1038/s41467-020-14411-z*.

Gudmundsson, Lukas and Matthias Cuntz. 2016. "Soil Parameter Model Intercomparison Project (SP-MIP): Assessing the Influence of Soil Parameters on the Variability of Land Surface Models." GEWEX-ISMC SoilWat workshop, Leipzig.

Schnepf, Andrea, Christopher K. Black, Valentin Couvreur, Benjamin M. Delory, Claude Doussan, Axelle Koch, Timo Koch, et al. 2020. "Call for Participation: Collaborative Benchmarking of Functional-Structural Root Architecture Models. The Case of Root Water Uptake." Frontiers in Plant Science 0 (March): 316. *https://doi.org/10.3389/FPLS.2020.00316*.

Vanderborght, Jan, Valentin Couvreur, Felicien Meunier, Andrea Schnepf, Harry Vereecken, Martin Bouda, and Mathieu Javaux. 2021. "From Hydraulic Root Architecture Models to Macroscopic Representations of Root Hydraulics in Soil Water Flow and Land Surface Models." Hydrology and Earth System Sciences Discussions, 1–37. *https://doi.org/10.5194/hess-2021-14*.

Vereecken, Harry, Lutz Weihermüller, Shmuel Assouline, Jirka Šimůnek, Anne Verhoef, Michael Herbst, Nicole Archer, et al. 2019. "Infiltration from the Pedon to Global Grid Scales: An Overview and Outlook for Land Surface Modeling." Vadose Zone Journal 18 (1): 1–53. *https://doi.org/10.2136/vzj2018.10.0191*.

Wang, Yunfei, Yijian Zeng, Lianyu Yu, Peiqi Yang, Christiaan Van Der Tol, Qiang Yu, Xiaoliang Lü, Huanjie Cai, and Zhongbo Su. 2021. "Integrated Modeling of Canopy Photosynthesis, Fluorescence, and the Transfer of Energy, Mass, and Momentum in the Soil-Plant-Atmosphere Continuum (STEMMUS-SCOPE v1.0.0)." Geoscientific Model Development 14 (3): 1379–1407. *https://doi.org/10.5194/GMD-14-1379-2021*.

Weihermüller, Lutz, Peter Lehmann, Michael Herbst, Mehdi Rahmati, Anne Verhoef, Dani Or, Diederick Jacques, and Harry Vereecken. 2021. "Choice of Pedotransfer Functions Matters When Simulating Soil Water Balance Fluxes." Journal of Advances in Modeling Earth Systems 13 (3): e2020MS002404. *https://doi.org/10.1029/2020MS002404*.

Zeng, Yijian, Anne Verhoef, Dani Or, Matthias Cuntz, Lukas Gudmundsson, Lutz Weihermueller, Stefan Kollet, Jan Vanderborght, and Harry Vereecken. 2021. "GEWEX-ISMC SoilWat Project: Taking Stock and Looking Ahead." GEWEX Newsletter 2: *https://www.gewex.org/gewex-content/files_mf/16339*.

Report of Division 3: Soil Use and Management

Please note that the main division report was submitted in February 2022. Some of the events and activities referred to may have taken place in the interim.

Division 3"Soil Use and Management" focuses on how we use the soil and how it links to the knowledge base of Divisions 1 and 2 to ensure that soils are used and managed in a sustainable manner. The Division is concerned with both soil use and management in terms of agricultural production, forestry, grazing lands, and the broader environmental context. Activities to remediate degraded soil, arising from the Agricultural misuse of soil or contaminations resulting from agricultural or non-agricultural activities are part of the scientific area of this Division. The aim of this Division is to ensure that through our knowledge and understanding of soil properties and processes and the Distribution of soils within the landscape soils and soil quality are maintained and improved

Commission Chair and Vice chair

3.1 Soil Evaluation and Land Use Planning	Chair	Ivan Vasenev/Russia
	Vice Chair	Jagdish Prasad, India
3.2 Soil and Water Conservation	Chair	Lillian ØYGARDEN, Norway
	Vice Chair	Nobuo TORIDE, Japan
3.3 Soil Fertility and Plant Nutrition	Chair	Bruno GLASER, Germany
	Vice Chair	Toru Fujiwara/Japan
3.4 Soil Engineering and Technology	Chair	Jiabao ZHANG, China
	Vice Chair	Laura E. PAULETT, Romania
3.5 Soil Degradation, Control, Remediation and Reclamation	Chair	Stefan NORRA, Germany
	Vice Chair	Junta Yanai, Japan
3.6 Salt Affected Soils	Chair	Tibor Tóth, Hungry
	Vice Chair	Ki-In Kim, South Korea

Working Groups (WG) Chair and Vice Chair

1. Acid Sulphate Soils	Chair	Anton Boman, Abo University, Finland
	Vice Chair	Vanessa Wong, Southern Cross University, Australia
2. Forest Soils	Chair	Zhi hong Xu, Griffith University, Australia
	Vice Chair	Chris Johnson, Syracuse University, USA
3. Paddy Soils	Chair	Mizuhiko Nishida, NARO Tohoku Agricultural Research Center, Japan
	Vice Chair	Bentio Heru Purwanto, Gadjah Mada University, Indonesia
4. Soils of Urban, Industrial, Traffic, Mining and Military Areas (SUITMA)	Chair	Kye-Hoon John Kim, The University of Seoul, Korea
	Vice Chair	Przemyslaw Charzynski, Nicolaus Copernicus University, Torun, Poland

Structure and officers

In 2021 **Division 3** consisted of 6 commissions and 4 working groups (WG). They are briefly presented below along with chair and vice chair responsible for commission or working group's activities.

Commission 3.1 – Soil evaluation and land use planning
Commission 3.2 – Soil and water conservation
Commission 3.3 – Soil fertility and plant Nutrition
Commission 3.4 – Soil engineering and Technology
Commission 3.5 – Soil degradation control, remediation, and reclamation
Commission 3.6 – Salt-affected Soils

Chair and Vice-Chair of Division 3 – Soil use and management

Chair: Bal Ram Singh/Norway
1st Vice Chair: Bob REES, United Kingdom
2nd Vice Chair: Tom ASPRAY, United Kingdom

Activities of the division and commissions

Report from Division 3

- Division chair finalized a note on special issue by divisions on **Managing Soils for Sustainable Agriculture – Present Situation and Future Challenges.**
- Negotiation with PNSS (Japanese) did not give desired results and hence the process with another journal is on.
- A seminar in cooperation with Prof. Lillian ØYGARDEN, chair of Commission 3.2, and the European Society for Soil Conservation, the Norwegian Soil Science Society, the Nordic Association of Agricultural Science (NJF) and the IUSS was planned for 2021 but had to be postponed until 2022. The topic of the seminar was "**Soil and water conservation under changing climate in Northern or high-altitude conditions**" held at NMBU campus Ås, Norway, in May 2022.
- Division chair prepared nomination list for IUSS election.
- Division chair also participated in the seminar series of Commission 3.5.
- Along with some of the commission chairs, Division chair participated in the IUSS Forum meetings held in 2021 and contributed to a publication mentioned below.

Lal, R., Bouma, J., Brevik, E., Dawson, L., Field, D.J., Glaser, B., Hatano, R., Hartemink, A.E., Kosaki, T., Lascelles, B., Monger, C., Muggler, C., Ndzana, G.M., Norra, S., Pan, X., Paradelo, R., Reyes-Sánchez, L.B., Sandén, T., **Singh, B.R.**, Spiegel, H., Yanai, J. & Zhang, J. 2021. Soils and sustainable development goals of the United Nations: An International Union of Soil Sciences perspective. Geoderma 25: *https://doi.org/10.1016/j.geodrs.2021.e00398.*

Division chair presented the activities and plans of Division 3 during the Executive Council (EC) meeting in January 2022 with a title "Progress report of Division 3".

Soil Use and Management – 2021. The whole presentation was sent to IUSS and is available from the IUSS Secretariat.

Commission 3.1 – Soil evaluation and land use planning

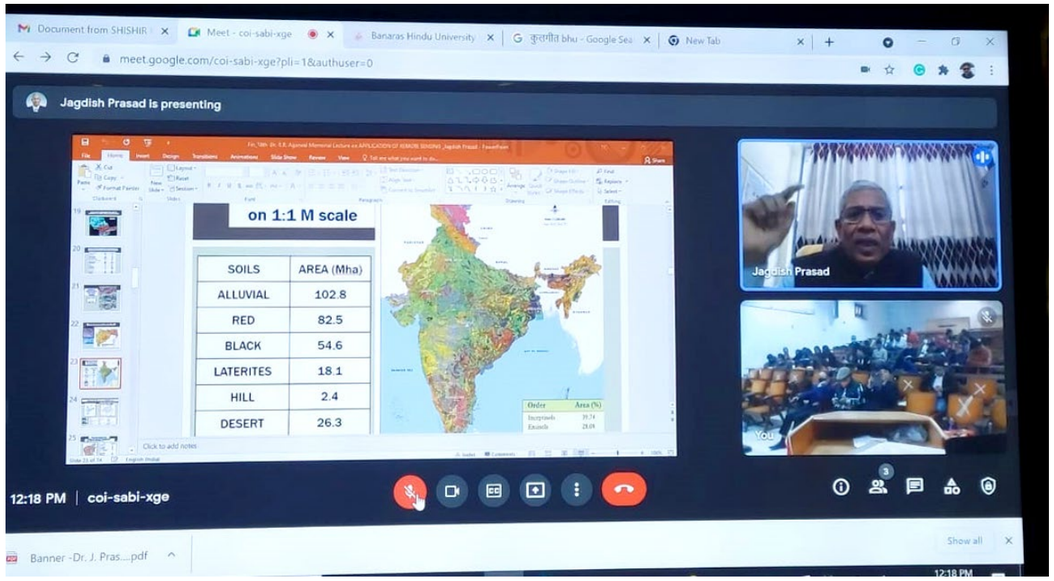
Chair: Ivan Vasenev/Russia
Vice Chair: Jagdish Prasad, India

Awards

Shri. H.S. Shankarnarayan and Dr. L.R. Hirekerur have been inducted as Honorary members of the Indian Society of Soil Survey and Land Use Planning, Nagpur in the year 2021. Dr. K.S. Anil Kumar, Dr. M.S.S. Nagaraju, Dr. M.V.S. Naidu, Dr. V. Ramamurthy have been inducted as Fellow of the Indian Society of Soil Survey and Land Use Planning, Nagpur in the year 2021.

Events

- Dr. Jagdish Prasad, President (2017-2021), Indian Society of Soil Survey and Land Use Planning Nagpur organized a webinar on 11th September 2020. Dr. Rattan Lal, World Food Prize Laureate-2020, a distinguished university professor of soil science and director of the Carbon Management and Sequestration Center, Ohio State University, USA delivered a webinar on the topic "Soil Survey and Land Use Planning for Realizing Sustainable Development Goals of the United Nations". He categorically stressed to protect, preserve, and restore soil health for the welfare of human being.
- Dr. Jagdish Prasad chaired Technical Session- IV (Developments in Nutrients Management Strategies) of 2nd International Web-Conference of ANRCM on Smart Agriculture for Resource Conservation and Ecological Stability (October 29-31), Lucknow, India. Prof. Edoardo A.C. Costantini, President-Elect, International Union of Soil Sciences was the Chief Guest. In the session IV, Dr. N.K. Sankhyan delivered the keynote address and Dr. M.S. Nagaraja was Lead Speaker. Sixteen papers were listed for oral presentations but only eleven have been presented.
- Dr. Jagdish Prasad delivered 18th Dr. R. R. Agrawal Memorial Lecture (Constituted by Indian Society of Soil Science) organized by Varanasi Chapter of Indian Society of Soil Science at Institute of Agricultural Sciences, Banaras Hindu University, Varanasi on 5th December 2021. The talk of his lecture (virtual) was Application of Remote Sensing in Soil Characterization and Mapping.
- Dr. Jagdish Prasad, President, Indian Society of Soil Survey and Land Use Planning in collaboration of ICAR- National Bureau of Soil Survey and Land Use Planning, Amravati Road, Nagpur organized a programme on 8 December 2021 to create awareness among the citizens including college students and stakeholders. Under this programme, Dr. A.K. Srivastava, Principal Scientist, Central Citrus Research Institute has given a scintillating lecture on Soil a Service Provider to Mankind and highlighted the role of soil beyond the pro-



Dr. Jagdish Prasad delivering the lecture
(© Jagdish Prasad)

duction system including historical perspective. He covered the aspect of nutrient stripping, global disparity between food security and soil nutrient stocks; rhizosphere hybridization and use of microbial consortium in building the soil health.

Publications

Book Chapter

Jagdish Prasad, Rajeev Srivastava, Karthikeyan, K., Verma, C.B.P. (2021). Challenges in soil science education in India and way forward. (Ed. Takashi Kosaki, Rattan Lal, Laura Bertha Reyes Sánchez). *In:* Soil Sciences Education: Global Concepts and Teaching. Published by International Union of Soil Sciences. pp. 69-76.

Research Papers

Solanke, Preeti C., Rajeev Srivastava, Jagdish Prasad, Nagaraju, M.S.S., Patil, N.G., Nasre, R.A., Naitam, R.K. and Wakode, R.R. (2021). Spectral reflectance properties of Vertisols and associated soils of Nagpur district in Maharashtra. Journal of the Indian Society of Soil Science 69 (1): 21-27.

Jagdish Prasad, Anil Kumar, K.S., Nair, K.M., Dhanorkar, B.A., Niranjan, K.V., Mohekar, D.S., and Koyal, Arti (2021). Shrink-swell soils of Palakkad district, Kerala: Their characteristics and classification. Journal of the Indian Society of Soil Science 69 (2): 113-118.

Rathi, S.G., Nagaraju, M.S.S., Srivastava, Rajeev, Jagdish Prasad, Tiwary, P. and Nasre, R.A. (2021). Soil mapping and land evaluation of Khandala village in Nagpur district using high resolution satellite data and GIS. Indian Journal of Soil Conservation 49 (3): 181-189.

Verma, S.K. Singh, Anil K. Akhilesh Singh and Jagdish Prasad (2021). Site-specific approach for greening and sustainable development of Chambal Ravine. Journal of Soil and Water Conservation 20 (4), 375-385.

Priyanka Deshmukh, Nagaraju, M.S.S., Nirmal Kumar, Nisha Sahu, G.P. Obi Reddy, Rajeev Srivastava, Jagdish Prasad (2021). Spatial variability in length of growing period using meteorological and space-based data in Nagpur district of Maharashtra. Agropedology 31(2), in press.

Verma, T.P., Singh, R.S., Jagdish Prasad, Tailor, B.L., Rameshwar Singh and Meena, R.S. (2022). Characterization of soils of Deesa taluka, Banaskantha district of Gujarat and their suitability evaluation for groundnut and potato. Indian Journal of Fertilizers 18(2), in press.

Karthika, K.S., Anil Kumar, K.S., Srinivasan, R., Chandrakala, M., Lalitha, M., Srinivas, S., Rajendra Hegde, Arti Koyal, Maddileti, N., Parvathy, S. Archana, K.V. and Jagdish Prasad (2021). Quantitative evaluation of soil fertility constraints in a semi-arid ecosystem of North Telangana Plateau by employing Fertility Capability Classification (FCC) system. Journal of the Indian Society of Soil Science (Accepted).

Saha, K., Anil Kumar, K.S, Karthika, K.S., Hegde, R. and Jagdish Prasad (2021). Spatial distribution of nutrients in of major mango-growing soils of different agro-climatic zones of Karnataka and its impact on yield. Indian Journal of Horticulture (communicated).

Choudhari, Pushpajeet L., Jagdish Prasad and Gurav, Priya (2021). Genesis and mineralogy of teak-supporting soils in Seoni district of Madhya Pradesh. Indian Society of the Soil Science (communicated).

Popular article

Jagdish Prasad, Patil, N.G. and Suman Bala Singh (2021). Yavatmal – Some Observations and Suggestions. Indian Farmers Digest (Accepted).

Activities

Activity 1: Use of Soil Survey Information for Sustainable Production in Climate Change Scenario

Soil is one of the most important non-renewable natural resource for agricultural production. It provides anchorage to the crop plants and supplies the needed nutrients for its growth and development. Still 50% of the Indian population is dependent on agriculture and occupation related to agriculture. In India, injudicious use of land resources resulted in approximately 120 m ha degraded land, and this needs retrospection. Further, climate change is also prominently affecting the production system in one or other ways.

Soil surveys describe the characteristics of the soils, classify them, plot the boundaries of the soils on an appropriate base map and make predictions about the behavior of soils. Information collected in soil survey helps in development of land use plans and evaluates and predicts the effects of land use on the environment. The soil survey also provides the potential and constraints of a parcel of land with geo-tag. It also highlights the potentiality of soil system for various degradation process and if appropriate actions are not taken in time, the situation may further aggravate.

Visualizing the issues confronting the production, one day brainstorming session is proposed to be organized at ICAR-NBSS&LUP Nagpur to deliberate on sustainable land use planning resilient to climate change for sustained production.

Venue: ICAR-NBSS&LUP, Nagpur, India.

Activity 2: Soil-Site Suitability Evaluation for Major Plantation Crops in South India

Soil-site evaluation is the means of helping different stakeholders for varied uses and to make wise decisions about land use and management. South India has been blessed with climate and soils more suited for plantation crops. In recent past, the productivity of plantation crops declined due to abiotic (atmospheric and edaphic stresses) and biotic stresses. It is now high time to deliberate on the customized land use planning to identify potential areas and parcel of lands having constraints for raising plantation crops. Further, those area which were under plantation crop earlier but have been abandoned due to complex system of farming need to be revisited and their assessment might throw some light on factors/issues related to discontinuance of crop and cropping system.

In view of the above, a two days workshop is proposed to be organized at ICAR-NBSS&LUP at Regional Centre, Bangalore to have threadbare discussion on soil-site suitability evaluation so that promising land use could be suggested in view of existing ecosystem and policy guidelines.

Venue: ICAR-NBSS&LUP at Regional Centre, Bangalore, India.

NB: The proposed activities (1&2) could not be put into operation due to Covid-19

- We are also working on crop suitability assessment using multi-criteria evaluation and geo-spatial technology.
- Working on spatial variability in mango-growing soils of eastern and southern India.

Commission 3.2 – Soil and Water Conservation

Chair: Lillian Øygarden, Norway
Vice Chair: Nobuo Toride, Japan

Commission 3.2 acknowledges that an essential element in many soil management strategies is the need to maintain the quality of the soil resource through appropriate soil and land management practices, including tillage. Frequently, the conservation of soil is intimately coupled with the management of surface waters through erosion control. In addition to the prevention of erosion by water and wind, this Commission will also concern itself with the efficient management of soil water through irrigation, drainage, and the limitation of water loss from the soil surface.
In 2021 the Covid situation has influenced activities and possibilities for arranging seminars.

Recent activities

Planning activities and contribution to IUSS World Congress in Glasgow in 2022.
Commission.3.2 will hold the seminar **B21.Soil water, pollution, and gas movement in the context of climate change with two sessions.** Chair of Commission 3.2, Lillian Øygarden, and Vice Chair, Nobuo Toride, have reviewed abstracts for the program and will moderate the seminar.

Planning of an international seminar:
Soil and water conservation under changing climate in Northern and high-altitude conditions.

Landscape in Norway
(© Lillian Øygarden, NIBIO)

Commission 3.2 has, together with Bal Ram Singh, Chair of Division 3, and cooperation partners, planned the program and sent invitations for the international seminar 4-6th May 2022 in Ås, Norway.
https://nibio.pameldingssystem.no/soil-and-water.

Topics:

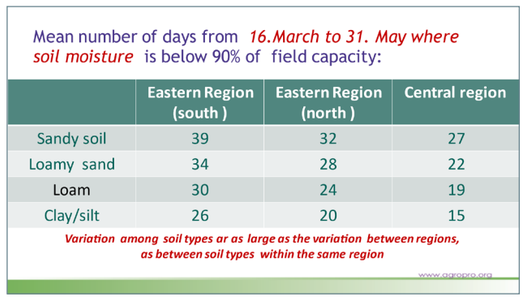
- Soil and water conservation challenges
- Soil functions and soil health
- Changes in hydrological pathways
- Best farming and management practices
- Monitoring, modelling, and planning tools

The seminar was organized by IUSS (International Union of Soil Science), ESSC (European Society for Soil Conservation), NLF (Nordic Association for Agricultural Science), Norwegian extension Service (NLR), Norwegian Institute of Bioeconomy Research (NIBIO) and Norwegian University of Life Sciences (NMBU) and the Organizing Committee. Some highlights (screenshots) of the seminar are presented at the next page.

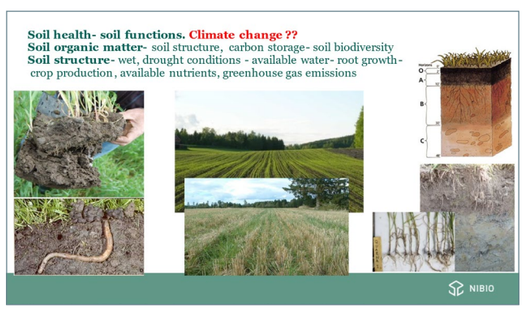
Screenshots of the seminar 'Soil and water conservation under changing climate in Northern and high-altitude conditions' (© Lillian Øygarden, NIBIO)

Global Forum for Food and Agriculture

Lillian Øygarden (Commission 3.2) participated in planning the contributions from IUSS to the Expert panel: **Global perspectives on sustainable soil management towards food security**, held at the 14th Global Forum for Food and Agriculture (GFFA) on the topic of "Sustainable Land Use: Food Security Starts with the Soil" which took place 24 to 28 January 2022. Contribution: Soil and water conservation under Northern climatic conditions. Sustainable land management to secure high yields and improve soil protection.
Detailed program:
https://www.gffa-berlin.de/en/fachpodien_2022/iuss/.



	Eastern Region (south)	Eastern Region (north)	Central region
Sandy soil	39	32	27
Loamy sand	34	28	22
Loam	30	24	19
Clay/silt	26	20	15



Screenshots from the Global Forum for Food and Agriculture (© Lillian Øygarden, NIBIO)

Planned future activities for 2022

IUSS World Congress in Glasgow 31 July – 5 August 2022.

Commission 3.2 will hold the seminar: B21.Soil water, pollution, and gas movement in the context of climate change with two Sessions. The Seminar will be moderated by the chair of Commission 3.2 Lillian Øygarden and vice chair Nobu Toride.

At the Congress there will be discussions of further plans for the Commission for the next congress period.

Commission 3.3 – Soil Fertility and Plant Nutrition

Chair: Bruno Glaser, Germany

Vice Chair: Toru Fujiwara, Japan

The management of soil fertility is a major activity of a substantial proportion of the world's soil scientists. The inclusion of plant nutrition in the title of this Commission recognizes the often very close relationship between those managing soil fertility and those concerned directly with plant nutrition. This Commission would concern itself with the identification of technologies appropriate to the soil conditions and combinations of soil conditions.

Events

- Online sessions and discussions on joint publication "Soils and sustainable development goals"
- Online sessions and discussions on joint publication "Soil health"

Recent activities

- Revise and support new Website
- Joint publications
- Organization of IUSS congress

Planned future activities

Special publication by IUSS divisions – 2022

Managing Soils for Sustainable Agriculture – Present Situation and Future Challenges

In addition to some contribution to other divisions, commission 3.3 will primarily contribute to Division 3 topics.

Division 3 – Soil Use and Management

1. Soil Management for improved productivity and soil health for sustaining human health
   Bruno Glaser (*bruno.glaser@landw.uni-halle.de*), Amor Mtimet, Bal Ram Singh (*balram.singh@nmbu.no*).
2. Soil degradation neutrality and land use change
   Lillian Øygarden *Lillian.oygarden@nibio.no*; Amor Mtimet, Remigio Paradelo. Devraj Chalise
3. Agricultural and food residues nutrient and energy recovery in a circular economy
   Remigio Paradelo, Bruno Glaser (*bruno.glaser@landw.uni-halle.de*).

Publications

Lal, R, J Bouma, E Brevik, L Dawson, D J Field, B Glaser, R Hatano, et al. 2021. "Soils and Sustainable Development Goals of the United Nations: An International Union of Soil Sciences Perspective." GEODERMA REGIONAL 25. *https://doi.org/10.1016/j.geodrs.2021.e00398*.

Link to Newsletter (published every six months): *https://www.iuss.org/newsroom/newsletters/soil-morphology-and-micromorphology-newsletters-commission-11/*.

Commission 3.4 – Soil Engineering and Technology

Chair: Jiabao, Zhang, China

Vice Chair: Laura E. Paulette, Romania

Events

- 'The second national soil remediation conference' was held 24th – 27th of October 2021, in Nanjing (China).
- 'Symposium on soil physics and Rural Revitalization' was held 29th Oct – 3rd Nov 2021, in Kunming (China).
- 'Celebration of World Soil Day 2021 & Naming ceremony of the Asteroid ISSCAS' was held on the 5th of December 2021, in Nanjing (China).
- The inaugural meeting between Soil Science Society of China and Soil Science Society of America working groups for scientific cooperation and collaboration was held on 7th December 2021.

Recent activities

A letter of agreement to explore and promote collaboration opportunities between the Soil Science Society of China (SSSC) and the Soil Science Society of America (SSSA) was signed in the spring of 2021.

Publications

Yongjun Xu, Xin Liu, Xin Cao, Changping Huang, Enke Liu, Sen Qian, Xingchen Liu, Yanjun Wu, Fengliang Dong, Cheng-Wei Qiu, Junjun Qiu, Keqin Hua, Wentao Su, Jian Wu, Huiyu Xu, Yong Han, Chenguang Fu, Zhigang Yin,Miao Liu, Ronald Roepman, Sabine Dietmann, Marko Virta, Fredrick Kengara, Ze Zhang, Lifu Zhang,Taolan Zhao, Ji Dai, Jialiang Yang, Liang Lan, Ming Luo, Zhaofeng Liu, Tao An, Bin Zhang, Xiao He, Shan Cong, Xiaohong Liu, Wei Zhang,James P. Lewis, James M. Tiedje, Qi Wang, Zhulin An, Fei Wang, Libo Zhang, Tao Huang, Chuan Lu, Zhipeng Cai,Fang Wang, and Jiabao Zhang,2021. Artificial intelligence: A powerful paradigm for scientific research. The Innovation. 2, 100179. *https://doi.org/10.1016/j.xinn.2021.100179*.

Commission 3.5 – Soil degradation control, remediation, and reclamation

Chair: Stefan Norra, Germany,

Co-Chair: Junta Yanai, Japan,

Many soils worldwide face severe stress due to contamination, nutrient depletion or over-fertilization, erosion and urbanization. There is no terrestrial life without soils. Soils provide essential ecosystem services for human civilization. The purpose of this Commission is to develop and use our knowledge and understanding of soil properties and processes to ensure that damaged/degraded soils may be remediated or reclaimed and returned to natural condition and productive use.

Activities

Our activities in 2021 suffered from the ongoing Corona crisis. However, our commission carried out an online lecture program:

22/01/2021	Urban Soils	Stefan Norra	Karlsruhe Institute of Technology, Germany
26/02/2021	Soil mineralogy and their protective role in the carbon sequestration in the tropical region	Georges Ndzana	University of Dschang, Cameroon
26/03/2021	Soils contaminated with potentially toxic elements in Poland – status, environmental risk, and approaches to remediation	Anna Karczewska	Wrocław University of Environmental & Life Sciences, Poland
23/04/2021	Use of compost in environmental remediation	Remigio Paradelo Núñez	University of Santiago de Compostela, Spain
25/06/2021	Digital Soil Mapping of Nepal	Shree Prasad Vista	National Soil Science Research Center, Nepal
30/07/2021	Soil Microbes to Farmers Practices; Connecting Dots Through Soil Microbiology	Eren Taskin	University Cattolica del Sacro Cuore, Piacenza, Italy
27/08/2021	Reclamation and rational management of radiocesium contaminated agricultural soils in Japan	Junta Yanai	Kyoto Prefectural University, Japan
24/09/2021	Soil Carbon Dynamics in Forest Islands and adjacent ecosystem types of West Africa	Caleb Melenya Ocansey	Forest Resources Technology, Kwame Nkrumah University of Science and Technology, Kumasi-Ghana

These meetings usually take place at 11 a.m. CET (UTC +1H) on the last Friday of each month. We plan to proceed with this format in 2022. Every interested soil scientist is invited to take part, just contact the chair, or vice chair for detailed information.

Furthermore, some of our commission members contributed to the review organized by Rattan Lal on "Soils and sustainable development goals of the United Nations: An International Union of Soil Sciences perspective" published in Geoderma.

Current active commission members

Bill Butterworth, Land Research Ltd, Great Britain

Gian Franco Capra, University of Sassari, Italy

Devray Chalise, Nepal Agricultural Research Council

Mark E Hodson, University of York, United Kingdom

Peter S. Hooda, Kingston University London, Great Britain

Anna Karczewska, Wrocław University of Environmental & Life Sciences, Poland

Karolina Lewinska, Wrocław University of Environmental & Life Sciences, Poland

Giulia Maisto, Universita' degli Studi di Napoli Federico II, Naples, Italy

Augustin Merino, University of Santiago de Compostela, Spain
Felipe Yunta Mezquita, Universidad Autónoma de Madrid, Spain
Amor Mtimet, Senior Independent Expert, Tunesia
Georges Martial Ndzana, University of Dschang, Cameroon
Stefan Norra, Karlsruhe Institute of Technology, Germany
Remigio Paradelo Núñez, Universidade de Santiago de Compostela, Spain
Caleb Melenya Ocansey, Forest Resources Technology, Kwame Nkrumah University of Science and Technology, Kumasi-Ghana
Jose Navarro Pedreño, Universidad Miguel Hernández de Elche, Alicante, Spain
Francisco José Martín Peinado, University of Granada, Spain
Rafael Blanco Spulveda, University of Malaga, Spain
Eren Taskin, Università Cattolica del Sacro Cuore, Piacenzy, Italy
Shree Prasad Vista, National Soil Science Research Center, Nepal
Junta Yanai, Kyoto Prefecture University, Japan
Teresa Sauras Yera, University of Barcelona, Spain
Further members are warmly welcomed!

Selected Publications

Al-Zawahreh, K., Barral, M.T., Al-Degs, Y., Paradelo, R., 2021. Comparison of the sorption capacity of basic, acid, direct and reactive dyes by compost in batch conditions. *Journal of Environmental Management*, 294, 113005.

Azinwi Tamfuh, P., Taku Agbor-Ambang, S., Bitondo, D., Ndzana, G.M., Ambe Singwa, A., Wirba Ngonjang, L., Thaddeus Nji, J., Temgoua, E., 2021: Soil fertility amendment using cocoa pod husk and plantain peels powders for Okra (Abelmoschus esculentus, kirikou variety) production in Dschang (Cameroon Western Highlands). Agricultural and Biological Research Vol. 37 No.6.

Azinwi Tamfuh T, Ndzana GM, Nji GT, Bitondo D, Wirba Ngonjang L, Agbor-Ambang ST, Ambe Singwa A, Temgoua E, Bitom D. (2022), Testing soil fertility and beetroot (Beta vulgaris l.) production with mixtures of basalt dust, poultry manure and NPK 20-10-10 in Dschang (Cameroon Western Highlands), Journal of Agricultural and Rural Research, 6(2), 53-66.

Eguchi, T., Ishikawa, T., Fujimura, S., Ota, T., Wakabayashi, S., Matsunami, H. and Shinano, T. 2021, Application of Finnish phlogopite as a countermeasure to reduce radiocesium uptake by paddy rice. Journal of Environmental Radioactivity, 237, 106687, *https://doi.org/10.1016/j.jenvrad.2021.106687*.

Georges Martial Ndzana., Dortie Kolleh, A., Kashif, A. K., Bondje Bidjeck, L. M., Bekoa, E., Azinwi Tamfuh, P., Odigui Ahanda, D. H., Abodo Koa, T. M., Temgoua, E., Abossolo-Angue Abane, M., & Bitom, D. L. 2021. Studying the Application and Advances of Diffusive Gradients in-Thin Films Techniques (DGTs) to Constrain Mobility and Bioavailability of Heavy Metals in Soils. Journal of Geoscience and Environment Protection, 9, 118-137. *https://doi.org/10.4236/gep.2021.950095/2021*: 4770.

Georges Martial Ndzana., Bidjeck, L.M.B., Tamfuh, P.A., Kolleh, A.D., Ahanda, D.H.O., Bekoa, E., Kubar, K.A., Koa, T.M.A., Amadou, A., Abane, M.A.-A., Bitom, L.D., 2021. Impact of Iron and Aluminum on the Aggregate Stability of Some Latosols in Central and Southern Liberia (West Africa). International Journal of Plant & Soil Science, 11-18.

Herbón, C., Barral, M.T., Paradelo, R., 2021. Potentially toxic trace elements in the urban soils of Santiago de Compostela (Northwestern Spain). *Applied Sciences*, 11(9), 4211.

Ishikawa, J., Fujimura, S., Murai-Hatano, M., Baba, K., Furuya, M., Goto, A. and Kondo, M. (2021), Changes in cesium distribution in field-grown rice plants throughout the cultivation period. Plant and Soil, 469: 475-487. *https://doi.org/10.1007/s11104-021-05189-0*.

Kubo, K., Maruyama, H., Fujimoto, H., Suzuki, M., Kan, A., Unno, Y and Shinano, T. 2021, Comparative study of radioactive cesium transfer from soil to peanut and soybean. Soil Science and Plant Nutrition, DOI: *https://doi.org/10.1080/00380768.2021.1988829*.

Lal, R., Bouma, J., Brevik, E., Dawson, L., Field, D. J., Glaser, B., Hatano, R., Hartemink, A., Kosaki, T., Lascelles, B., Monger, C., Muggler, C., Ndzana, G. M., Norra, S., Pan, X., Paradelo, R., Reyes-Sánchez, L. B., Sandén, T., Singh, B. R., Spiegel, H., Yanai, J., and Zhang, J., 2021. Soils and sustainable development goals of the United Nations (New York, USA): An IUSS perspective. Geoderma Regional, e00398.

Lewinska, K.; Duczmal-Czernikiewicz, A.; Karczewska, A.; Dradrach, A.; Iqbal, M., (2021). Arsenic forms in soils of various settings in the historical ore mining and processing site of Radzimowice,Western Sudetes. Minerals 11, 491.

Matsunami, H., Uchida, T., Kobayashi, H., Ota, T. and Shinano, T. (2021), Comparative dynamics of potassium and radiocesium in soybean with different potassium application levels. Journal of Environmental Radioactivity, 233: 106609. *https://doi.org/10.1016/j.jenvrad.2021.106609*.

Paradelo, R., Herbón, C., Barral, M.T., 2021. Composition and chemical properties of the soils of the city of Santiago de Compostela, northwestern Spain. *Journal of Environmental Quality*, 50, 7-21.

Rasool B., ur-Rahman M., Adnan Ramzani P.M., Zubair M, Khan M.A., Lewinska K., Turan V., Karczewska A., Khan S.A., Farhad M., Tauqeer H.M., Iqbal M. (2021). Impacts of oxalic acid-activated phosphate rock and root-induced changes on Pb bioavailability in the rhizosphere and its distribution in mung bean plant. Environmental Pollution 116903.

Saljnikov, E. et al. (ed) (2022): Advances in Understanding Soil Degradation, Springer, pp 796. *https://doi.org/10.1007/978-3-030-85682-3*.

Tanzeem-ul-Haq H.S., Rasool B., Ehtisham-ul-Haque S., Saif S., Zafar S., Younis T., Akhtar I., Jafri L., Iqbal N., Masood N., Lewińska K., Iqbal M., (2021). Chitosan with Bentonite and Biochar in Ni-Affected Soil Reduces Grain Ni Concentrations, Improves Soil Enzymes and Grain Quality in Lentil. Minerals 11(1): 1-19.

Tauqeer H.M., Karczewska A., Lewińska K., Fatima M., Khan S.A., Farhad M., Turan V., Ramzani P.M.A., Iqbal M. (2021). Environmental concerns associated with explosives (HMX, TNT, and RDX), heavy metals and metalloids from shooting range soils: Prevailing issues, leading management practices, and future perspectives. In: Handbook of Bioremediation, Physiological, Molecular and Biotechnological Interventions, 569-590.

Thoa, N.P., Takagai, Y. and Tsukada, H. (2022) Estimate the contribution of water-derived 137Cs in the total 137Cs in brown rice using water-to-brown rice transfer parameters and the ratio of 137Cs/133Cs, Soil Sci. Plant Nutr. (in press).

Tsukada, H. (2021): Radiocaesium in the environment of Fukushima, Recovery after Nuclear Accidents, Annals of the ICRP 2021, 50(1_suppl), 44-54. *https://doi.org/10.1177/01466453211006808*.

Tsukada, H., Yamada, D. and Yamaguchi, N. (2022): Accumulation of 137Cs in aggregated organo-mineral assemblage in pasture soils 8 years after the accident

Student Excursion (23 September 2021, organized by Stefan Norra) to the Tereno Research Site of the KIT Campus Alpine near to Garmisch Patenkirchen, Germany. The site is equipped with a fully automatic lysimeter system to analyse soil-atmosphere gas exchange. (© Stefan Norra)

at Fukushima Daiichi nuclear power plant, Science of the Total Environment 806, 150688. *https://doi.org/10.1016/j.scitotenv.2021.150688*.

Wakabayashi, S., Eguchi, T., Nakao, A., Azuma, K., Fujimura, S., Kubo, K., Saito, M., Matsunami, H. and Yanai, J. 2022: Effectiveness of non-exchangeable potassium quantified by mild tetraphenyl-boron extraction in estimating radiocesium transfer to soybean in Fukushima. Science of the Total Environment (in press).

Selected conference contributions

J Washington, GM Ndzana, H Mfouapon, R Kenne, X Gao, CA Masiello, 2021.Organic Carbon Content in Mt. Bambouto Soils Across Gradients in Land Use and Topography. AGU Fall Meeting 2021

Remigio Paradelo Núñez did act as convener of the session "3.14 Reuse of organic wastes as soil amendments" in Eurosoil, 23-27 August 2021.

Stefan Norra organized the 3rd symposia on "Wahrnehmung und Bewertung von Böden in der Gesellschaft" (Perception and evaluation of soils in society), 29-30 September 2021, Karlsruhe (about 40 participants).

Takuro Shinano and Atsushi Nakao, in collaboration with Junta Yanai, organized a special symposium in Fukushima, Japan on November 5, 2021, entitled "Past, present and future of agricultural fields: Summary of rational management of ^{137}Cs-contaminated soils –10 years after the accident at Fukushima Daiichi nuclear power plant (FDNPP). "(more than 260 online participants and about 100 on-site participants)

Symposium on 'Past, present and future of agricultural fields: Summary of rational management of ^{137}Cs-contaminated soils –10 years after the accident at FDNPP', 5 November 2021, organized by Takuro Shinano and Atsushi Nakao. (© Takuro Shinano)

Commission 3.6 – Salt-affected Soils

Chair: Tibor Tóth Hungary
Vice Chair: Ki-In Kim South Korea

Events

- Main organizer of 'First IUSS Conference on Sodic Soil Reclamation'. July 30. 2021, Changchun, China.
- The presented abstracts were published in the listed publication below.
- The Commission representative was co-organizer as Scientific Committee member of „Global Symposium on Salt-affected Soils, 20-22 October 2021, Virtual meeting". Before and during the meeting several activities were carried out, such as selection, judging, chairing, and reporting.

Recent activities

The Commission representative was invited to present keynote speeches at the World Soil Day scientific meetings. Title of lecture was 'Old issues and new challenges in soil salinity research'.

- **Seminar on Ecological Restoration of Salt-Affected Soils To Boost Productivity**, December 4, 2021, organized by the Academy of Natural Resource Conservation and Management (ANRCM), Lucknow, India.
- **Sixth Scientific and Practical Conference on Food Security and Soil Science**, dedicated to the World Soil Day organized by Lomonosov Moscow State University on December 5, 2021.

Planned future activities

Participation in the organization and activity of 22nd World Congress of Soil Science – Glasgow 2022

Publications

Wang, Zhichun, Tibor Tóth (eds.) 2021. First IUSS Conference on Sodic Soil Reclamation. July 30. 2021, Changchun, China, Book of Abstracts.

Working Group Acid Sulfate Soils

Chair: Dr Anton Boman, Finland
Vice Chair: Dr Vanessa Wong, Australia

Acid sulfate soils are those soils and sediments which contain metal sulfides and are found around the world in both coastal and freshwater environments. They are considered the nastiest soils in the world due to their release of acidity and potentially toxic metals into the environment when metal sulphides within these soils are exposed to oxygen. The acidic and metal-rich leachate from acid sulfate soils causes detrimental impacts to agricultural land, natural and managed ecosystems, watercourses, and infrastructure in urban environments. Through the organization of conferences and meetings and collaboration with scientific journals, the working group provides a forum for researchers whose work focuses on methods for mapping and characterization of acid sulfate soils and whose work include identifying solutions for management and remediation of these harmful soils.

Activities during 2021

- A decision regarding the arrangement of the 9th International Acid Sulfate Soils Conference in Adelaide, Australia was taken via a Zoom-meeting with Luke Mosley, Robert Fitzpatrick, Vanessa Wong, and Anton Boman. It was agreed, that due to the Covid-19 situation, the conference will be moved to 26-30 March 2023. A post conference field tour to the Norfolk Islands is also planned. The arrangement of the conference is coordinated by Professor Robert Fitzpatrick and Associate Professor Luke Mosley at the University of Adelaide. Information about the conference is found at *https://biological.adelaide.edu.au/acid-sulfate-soil/iassc/*.
- Work has been on planning an acid sulfate soils session at the 22nd World Congress of Soil Sciences in Glasgow 2022. The session, WG3.1 Acid sulfate soils, sulfidic materials, and wetland soils, attracted 36 abstracts. Lead Convener will be Anton Boman.
- Work on the working group website, *www.iasswg.com*, continued during the spring of 2021, but the website has not yet been made public.

Planned activities for 2022

- Publication of the working group´s website.
- Work on harmonization of acid sulfate soil classification will continue.

- Part of the working group members will meet during a General Working Group meeting at the WCSS 2022 in Glasgow.
- The position as Chair of the working group will be up for voting (the current Chair is willing to continue as Chair) during a General Meeting at the congress. Anton Boman (Chair) and Vanessa Wong (Vice-Chair) will be the Lead Convener and Co-convener, respectively at the WG Acid sulfate soils, sulfidic materials, and wetland soils-session at the congress.
- A special issue on acid sulfate soils is planned to be published in European Journal of Soil Science.

Working Group Forest Soils

Chair (GSM): Zhihong Xu, Australia
Vice Chair: Chris Johnson, USA
The IUSS WG Forest Soils has been a WG of IUSS since 1990 and is dedicated to all research activities of global forest soils. The Forest Soils WG has been involved in studying soil biological, chemical, and physical processes, focusing on biogeochemical cycles of carbon and nutrients as well as hydrological cycle at scale in forest ecosystems from local, regional, and global levels. The WG has also actively engaged in the development and application of advanced technologies and methods for investigating the important processes and functions in forest soils in response to global climate change and local management, underpinning both productivity and sustainability of forest ecosystems.

Events

The 10th International Symposium on Forest Soils 2020 – Forest Soils, Hangzhou, China, has been postponed and will be held during 18-21 October 2022, Hangzhou, China. This is due to the COVID-19 pandemics since early 2020.

Recent activities

- Both Prof. Johnson and I have been closely engaged in the development and organization of two WG3.2 oral sessions: C40 – Carbon and nutrient cycles under intensifying climate change and land management, and C41 – Advances in innovative technologies and methods for quantifying biochemical cycles of carbon and nutrients in forest soils.
- We are working closely with the Organizing Committee of the 22nd World Congress of Soil Science, 31 July – 5 August 2022, Glasgow, Scotland, UK.

Planned future activities

- 31 July – 5 August 2022: Hosting two WG Sessions of C40 and C41 in the 22nd WCSS, Glasgow, Scotland, UK.
- 18-21 October 2022: The 10th ISFS sponsored by IUSS via WG Forest Soils and Forest Soils Division of China Soil Science Society.
- Summer 2023: Joint SSSA and IUSS (via WG Forest Soils) North America Forest Soil Conference in USA.

Working Group Paddy Soils

Chair (PSWG): Mizuhiko Nishida, Japan
Vice Chair: Benito Heru Purwanto, Indonesia
The IUSS WG Paddy Soils is a WG of Division 3 Soil Use and Management of the IUSS. It is working to exchange information on the latest research on paddy soils and to contribute to the development of research related to paddy soils through organizing or supporting symposia. The Chair is Mizuhiko Nishida (Tohoku University, Japan), the Vice Chair is Benito Heru Purwanto (Gadjah Mada University, Indonesia). It organizes symposia mainly at the World Congress of Soil Science (WCSS) and the Conference of East and Southeast Asia Federation of Soil Science Society (ESAFS). In addition, it provides technical support for other conferences on paddy soils.

Recent activities

- The activities of Paddy Soils Working Group (PSWG) were severely restricted by COVID-19 in 2021 as well as in 2020.
- In 2021, PSWG, together with Prof. Asakawa, ex-Vice Chair of Soil Biology, IUSS, proposed a special section "Recent advances in biology and fertility studies of paddy field soil" to Biology and Fertility of Soils journal. Our proposal has been accepted and the preparation is underway.
- PSWG gave technical supports to the scientific committee for the 4th International Conference Organic Rice Farming and Production Systems (4th ORP) to be held in Sendai, Japan, 2023. The committee is currently considering the composition of 4th ORP.

Planned future activities

PSWG is planning to organize two sessions in 22nd WCSS, namely,

- "Recent advances in nutritional, biological and physical processes in paddy soils" and
- "Mitigation and adaptation strategies for climate change in rice-based systems".

Working Group Soils of urban, industrial, traffic, mining and military areas (SUITMA)

Chair: Kye-Hoon John Kim Korea
Vice Chair: Przemyslaw Charzynski, Poland

Due to COVID-19, the activities of WG SUITMA were not as active as planned.

Activities in 2021

1. The third newsletter of WG SUITMA was released. Read more: *https://sites.google.com/site/wgsuitma/*.
The main articles in the newsletter were as follows:

- Article of a new special issue about military activities and civilian/military shooting ranges and will cover broad framework studies related to aquatic and terrestrial systems. Title of the special issue, "Shooting and Military Activities: A Holistic Approach from Source, Contamination and Remediation" will be hosted in the MDPI journal *Applied Sciences*.
- Article of a scientific journal, *Moscow University Soil Science Bulletin*, a scientific peer-reviewed journal that has been published in a separate series since 1977. The journal is published four times per year.
- Article on the 2nd SUITMA International Seminar that was held on January 17, 2020, in Torun, Poland.

2. The 3rd SUITMA International Seminar was held at Torun, Poland on June 4, 2021.
Due to COVID-19, the seminar was a contact-free meeting.
The website for the Seminar:
https://sites.google.com/site/suitmaseminar/.

3. The organizing committee for the 11th SUITMA Conference decided to postpone the activity from 13-17 September 2021 to 05-09 September 2022 in Berlin, Germany. The theme of the conference is *Soils in the Water-Energy-Food Nexus*. The registration will be open on 15 February 2022. The deadline for abstract submission is 28 February 2022.
The website for 11th SUITMA: *https://suitma11.org*.

Group photo taken during the 2nd SUITMA International Seminar (© IUSS WG SUITMA)

Report of Division 4: The Role of Soils in Sustaining Society and the Environment

Please note that the main division report was submitted in March 2022. Some of the events and activities referred to may have taken place in the interim.

Division 4 takes the responsibility for making the connections, transfer and outreach of our soil knowledge to society where soil and soil science needs to be understood and appreciated. It takes the information generated in the other three Divisions and the developing new scientific information, addressing the public literacy in soil science, its education, international conventions, consequences of human activities on soil ecosystem services, policy issues, food security, and history of the discipline. As the capstone Division it integrates the science, scientists, policy makers, and the wider community to become more aware of soil as an essential natural resource.

Structure and officers

Chair: Prof. Damien J. Field, Australia
1st Vice Chairperson: Christine Watson, United Kingdom
2nd Vice Chairperson: Lorna Dawson, United Kingdom
Vice Chairs are responsible mostly for the organization of the World Congress; the Chair for communication with the commissions, working groups and vice chairs.

IUSS Division 4. Commissions and Working Groups:

- *Commission 4.1 – Soils and the Environment*
- *Commission 4.2 – Soils, Food Security, and Human Health*
- *Commission 4.3 – Soils and Landuse Change*
- *Commission 4.4 – Soil Education and Public Awareness*
- *Commission 4.5 – History, Philosophy, and Sociology of Soil Science*
- *Working Group – Cultural Patterns of Soil Understanding*

Division Chair Report

Chair: Damien J Field, Australia

All Division, Commission and Working Group Chairs and members have all continued to contribute to the planning of the World Congress of Soil Science. This has resulted in the organisation of two Interdivisional sessions and several scientific sessions. Both oral and poster presenters have now been informed and we look forward to meeting in Glasgow to hear the work that has been accepted and the planned discussions at the Division's meetings.

Event

Presented at 2nd International Conference on Organic Agriculture in the Tropics (ORGTROP), 28th & 29th October 2021, Online Conference, Gadja Mada, Indonesia Soil Security – Ensuring the ability to secure soil through connectivity.

Recent activities

Invited expert advisor for Panel presenting on WIL requirements – Program by Gaining Perspectives from the International Higher Education Experts Webinar Program – "Freedom of Learning, Independent Campus" Gadja Mada University 16th Dec 2021.

Publications

Kopittke P. M., Berhe A. A., Carrillo Y., Cavagnaro T. R., Chen Q-L., Dijkstra F. A., Field D. J., Grundy M. J., He J-Z., Hoyle F. C., Kögel-Knabner I., Lam S. K., Marschner P., Martinez C., McBratney A. B., Menzies N W., Mosley L. M., Mueller C. W., Murphy D. V., Nielsen U. N., O'Donnell A. G., Pendall E., Pett-Ridge J., Rumpel C., Young I. M., Budiman Minasny B. 2021. Ensuring planetary survival: Balancing the multifunctional nature of soils. Nature Sustainability, DOI: *10.1080/10643389.2021.2024484*.

Franceschinis C., Liebe U., Thiene M., Meyerhoff J., Field D. J., McBratney A. 2022. Norm activation and its effect on stated preferences in a discrete choice experiment. Australian Journal of Agriculture & Resource Economics, 59, 1-28 *https://doi.org/10.1111/1467-8489.12466*.

Singh K., Fuentes I., Fidelis C., Yinil D., Sanderson T., Snoeck D., Minasny B., Field D. J., 2021. Cocoa suitability mapping using multi-criteria decision making: An agile step towards soil security. Soil Security, 5, *https://doi.org/10.1016/j.soisec.2021.100019*.

Franceschinis C., Liebe U., Thiene M., Meyerhoff J., McBratney A., Field D. J. 2021. Attitudes and Preferences towards Soil-Based Ecosystem Services: How Do They Vary across Space? Sustainability, 13(16), 8722; *https://doi.org/10.3390/su13168722*.

Eusse-Villa L., McBratney A., Franceschinis C., Meyerhoff J., Thiene M., Field D. 2022. Mapping citizens' attitudes towards soil ecosystem services: A case study from New South Wales, Australia. Soil Security, (in press).

Planned future activities

To increase outreach and build on the experience of the Global Soil Security and other IUSS facebook sites we are planning to launch a Facebook site "Soil Connects" for Division 4. This will be moderated by Prof. Damien J Field. This facebook site will replace the Division 4 newsletter Soil Connects that was launched and edited by Damien Field in 2014. This move towards an online platform for Soil Connects responds to the increase in online sharing of information and extends to a community that is outside of the IUSS web presence.

Link to Website

Facebook: *Global Soil Security* – This site has over 8,200 members and shares posts focused on securing the world's resources to support biodiversity and global health along with the need for ensuring food, water and energy security. We ask questions such as "what can our soils do?", "can the soil continue to do this?", "who cares and why?", and "how is soil valued?", and if not, "how is it regulated?" Since 2018 this has grown substantially with global membership and averages at least 20 posts a week.

Commission 4.1 – Soils and the Environment

Chair: Morihiro Maeda, Japan
Vice Chair: Claudio Zaccone, Italy
This Commission looks at the soil as part of the ecosystem. Human activities have a strong impact on the ecosystems and the soil and environment interactions in relation to humans are particularly important. Soils – a major component of the biosphere at the interface between the lithosphere, atmosphere, and biosphere – are investigated through several international programs such as IGBP; in the same way the soil plays a considerable role in the carbon sequestration (UN Convention on Climate Change) and is the habitat for a number of species covered by the Biodiversity Convention.

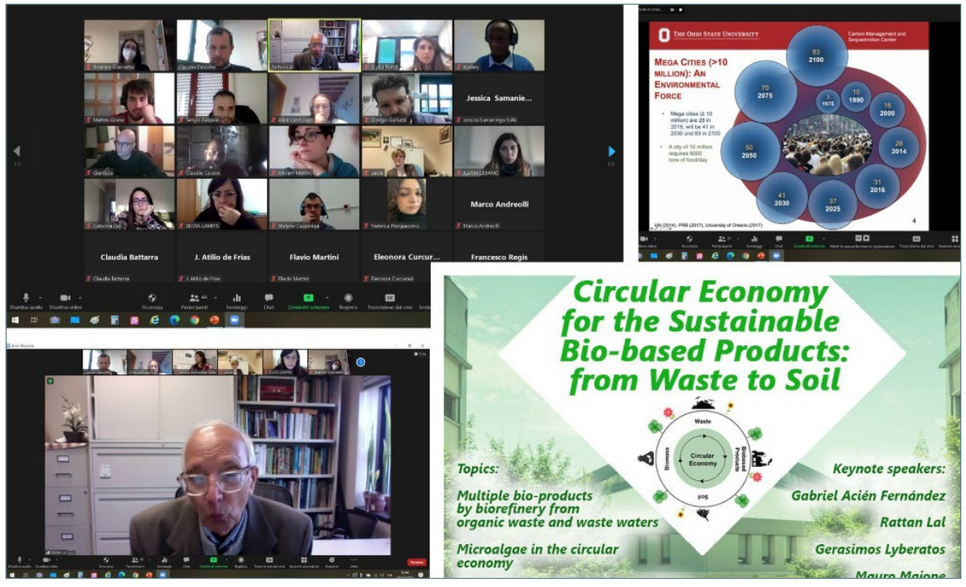
Events

- Japan Geoscience Union (JpGU) Meeting 2021, Session A-HW 22 "Material transportation and cycling in watershed ecosystems; from headwaters to coastal areas," was organized by Morihiro Maeda, Online, Japan, May 30 – June 6, 2021.
- Morihiro Maeda organized an international student exchange program "Online Exchange Program between Okayama University, University of Ruhuna, and National Taiwan University – Research Experiences in the field of Environmental Management" on March 7 and 8, 2022, which was financially supported by JST Sakura Science Plan (*https://sites.google.com/s.okayama-u.ac.jp/sakura-science2021/top*).

Online Exchange Program for students at Okayama University, Japan, University of Ruhuna, Sri Lanka and National Taiwan University, 7-8 March 2022 (© Morihiro Maeda)

- During the General Assembly of the European Geoscience Union (vEGU21: Gather Online | 19-30 April 2021; *www.edu.eu/*), four sessions have been co-organised and chaired by Claudio Zaccone (Commission 4.1, Vice Chair).
  1. SSS5.7/BG3. **Dynamics and functions of SOM pools under new and traditional soil amendments.** Conveners: Claudio Zaccone, Sarah Duddigan, Anna Gunina, Layla Marquez San Emeterio, Yakov Kuyakov, Cesar Plaza.
  2. US1. **Integrating geoscience into the European Green Deal**. Conveners: Ned Staniland, Chloe Hill, Maria-Helena Ramos, Claudio Zaccone.
  3. SSS5.1/BG3/CL3.1 **Mechanisms of soil organic matter stabilisation and carbon sequestration** Conveners: Cesar Plaza, Claire Cheng, Beatrice Giannetta, Claudio Zaccone
  4. SSS3.5/GM12. **Soils as records of past environmental conditions, climate change and anthropogenic impact.** Conveners: Oren Ackerman, Anna Schneider, Kushan Bao, Maria Bronnikova, Gael Le Roux, Tobias Sprafke, Barbara Fiakiewicz-Koziel, Claudio Zaccone.
- Claudio Zaccone was one of the main organisers of the virtual PhD Winter school "**Circular economy for the Sustainable Bio-based Products from waste to soil**" (*https://cews2021.azuleon.org/*) at the University of Verona (November 15-16, 2021). Prof. Rattan Lal attended as an Invited Speaker. His talk titled "Transforming bio waste into asset through soil carbon sequestration" was extremely interesting and inspiring. All attendees thanked Prof. Lal for sharing with them his knowledge and experience in soil sciences.

Screenshot from the virtual PhD Winter school
"Circular economy for the Sustainable Bio-based Products from waste to soil" (© Claudio Zaccone)



Publications

Rusydi, A.F.; Onodera, S.-I.; Saito, M.; Hyodo, F.; Maeda, M.; Sugianti, K.; Wibawa, S. 2021. Potential Sources of Ammonium-Nitrogen in the Coastal Groundwater Determination from a Combined Analysis of Nitrogen Isotope. *Biological and Geological Parameters, and Land Use, Water*. 13 (1), 25.

Bui, T. L., Mori, Y., Yamamoto, Y., Meada, M. 2021. Macropore structure and water management affect greenhouse gas emissions in agricultural fields. *Paddy and Water Environment*. 19(4) 661-672.

Schillaci, C., Saia, S., Lipani, A., Perego, A., Zaccone, C., Acutis, M. 2021. *Validating the regional estimates of changes in soil organic carbon by using the data from paired-sites: the case study of Mediterranean arable lands. Carbon Balance and Management*, 16: 19.

Marangi, M., Airoldi, S., Beneduce, L., Zaccone, C. 2021. *Wild whale faecal samples as a proxy of anthropogenic impact. Scientific Reports*, 11: 5822.

Bao, K., Zhang, Y., Zaccone, C., Meadows, M.E. 2021. *Human impact on C/N/P accumulation in lake sediments from northeast China during the last 150 years. Environmental Pollution*, 271: 116345.

Commission 4.2 – Soils, Food Security, and Human Health

Chair: Heide Spiegel, Austria
Vice Chair: tba
In most countries soils are essential for food production. Considering that one third of the land area is presently used for agriculture, and the world population is increasing, creating additional pressures on agricultural land, providing enough safe and nutritious food will be an ongoing challenge. Amount the conservation of agricultural land, the role of the soils in a changing world in relationship to human health.
No report for this period. Activities and events impacted by Covid-19.

Commission 4.3 – Soils and Landuse Change

Chair: Chenrong Chen, Australia
Vice Chair: Snooki Bellingrath-Kimura, Germany
Soils play a large role as source and sinks of greenhouse gases. In a context of global sustainability. This Commission will investigate how the source/sink functions of the soils can be managed and controlled to mitigate the impact of climate change. Of interest to all are significant changes in land use, including the effect of urbanisation, forest conversion and productive land being allocated to other uses. Such changes falls under the auspices of this Commission.

Awards

Sonoko_Bellingrath-Kimura won the "JoDe Preis 2022" (02/2022) *https://www.jadestiftung.org/jade-preis/2022*.

Events

(in chronological order starting with the oldest)

- Conference: landscape 2021: *https://www.Alf.de/en/aktuelles/landscape-conference/Pages/Lanscape-2021-Konferenz.aspx*.
- 1st Southeast Asia Rubber-based cropping Production Forum 2021 (Chair Prof Chenrong Chen, Scientific Committee) *https://serve.pgas.ph/aciarforum/Home*.
- Organized a session in 25th Japanese-German Symposium "Bioeconomics" 20-21 May, Berlin.

Recent activities

Prof. Chenrong Chen led the Griffith University Field Trip to the Lockyer Valley, September 2021.
Prof. Chenrong Chen: The Impact of Fire and Warming on Soil Carbon Dynamics at Southeast Queensland, Australia, December 2021.

Above:
Field Trip to the Lockyer Valley
(© Chenrong Chen)
Below:
The Impact of Fire and Warming on Soil Carbon Dynamics at Southeast Queensland
(© Chenrong Chen)

Planned future activities

- Co-chair Session 8 – Sustainable land use at the World Congress of Soil Science 2022, Glasgow.
- Prepare and participate in the Symposium of the Soil Protection Commission (Germany) on the 2nd May 2022 (postponed from 2/12/2021), "Without a Double Bottom. How soil protection secures the future".

Publications

Li, Q., Ma, H., Xu, Z., Feng, H., Bellingrath-Kimura, S. D. (2021) Balancing socioeconomic development with ecological conservation towards rural sustainability: a case study in semiarid rural China. *International Journal of Sustainable Development & World Ecology*. doi.org/10.1080/13504509.2021.1990157.

Bellingrath-Kimura, S. D., Burkhard, B., Fisher, B., Matzdorf, B. (2021) Ecosystem services and biodiversity of agricultural systems at the landscape scale (Editorial). *Environmental Monitoring and Assessment* 193, Supplement 1, Article 275. *https://doi.org/10.1007/s10661-021-08857-x*.

Schwartz, C., Shaaban, M., Bellingrath-Kimura, S. D., Piorr, A. (2021) Participatory mapping of demand for ecosystem services in agricultural landscapes. *Agriculture* 11, 12, Article 1193. *https://doi.org/10.3390/agriculture11121193*.

Wang, Y., Zhang, Q., Li, Q., Wang, J., Sannigrahi, S., Bilsborrow, R., Bellingrath-Kimura, S. D., Li, J., Song, C. (2021) Role of social networks in building household livelihood resilience under payments for ecosystem services programs in a poor rural community in China. *Journal of Rural Studies* 86, 208-225. *https://doi.org/10.1016/j.jrurstud.2021.05.017*.

Win, E. P., Win, K. K., Bellingrath-Kimura, S. D., Oo, A. Z. (2021) Influence of rice varieties, organic manure and water management on greenhouse gas emissions from paddy rice soils. *PLoS ONE* 16, 6, e0253755 [Correction: PLoS ONE 2022.17(1): e0263554]. *https://doi.org/10.1371/journal.pone.0253755*.

Xiangyu Liu, Mehran Rezaei Rashti, Rob Milla; Lukas Van. Zwieten, Maryam Esfandbod, Terry Granshaw, CR Chen* 2021 Responses of soil nutrients and microbial activity to different mill-mud application in a compaction-affected sugarcane field. *Soil Research*. Doi.org/10.1071/SR21162.

Mohammad Bahadori, Jun-Tao Wang, Ju-pei Shen, Stephen Lewis, Mehran Rezaei Rashti, Chengrong Chen* 2022 *Land Degradation and Development* (in press). *https://doi.org/10.1002/ldr.4174*.

Orpheus M. Butler, Tom Lewis, Sarah C. Maunsell, Mehran Rezaei Rashti, James J. Elser, B Mackey, CR Chen*. 2021 The stoichiometric signature of high-frequency fire in forest floor food webs. *Ecological Monographs* *https://doi.org/10.1002/ecm.1477*.

Enqing Hou, Dazhi Wen, Lifen Jiang, Xianzhen Luo, Yuanwen Kuang, Chengrong Chen, Keanan T Allen, Xianjin He, Xingzhao Huang, Yiqi Luo 2021 Latitudinal patterns of terrestrial phosphorus limitation over the globe. *Ecology Letters* 24, 1420-1431. DOI: 10.1111/ele.13761.

Mohammad Bahadori, CR Chen*, Stephen Lewis, Sue Boyd, Mehran Rezaei Rashti, Maryam Esfandbod, Alexandra Garzon-Garcia, Lukas Van Zwieten and Yakov Kuzyakov 2021 Soil organic matter formation is controlled by the chemistry and bioavailability of organic carbon inputs across different land uses. *Science of the Total Environment* 770, 145307 *https://doi.org/10.1016/j.scitotenv.2021.145307*.

Donat, M., Geistert, J., Grahmann, K., Bloch, R., Bellingrath-Kimura, S. D. (2022) Patch cropping – a new methodological approach to determine new field arrangements that increase the multifunctionality of agricultural landscapes. Computers and Electronics in Agriculture 197, Article 106894.

Egamberdieva, D., Alaylar, B., Kistaubayeva, A., Wirth, S., Bellingrath-Kimura, S. D. (2022) Biochar for improving soil biological properties and mitigating salt stress in plants on salt-affected soils. Communications in Soil Science and Plant Analysis 53, 2, 140-152.

Egamberdieva, D., Alimov, J., Shurigin, V., Alaylar, B., Wirth, S., Bellingrath-Kimura, S. D. (2022) Diversity and plant growth-promoting ability of endophytic, halotolerant bacteria associated with Tetragonia tetragonioides (Pall.) Kuntze. Plants 11, 1, Article 49.

Egamberdieva, D., Ma, H., Reckling, M., Omari, R. A., Wirth, S., Bellingrath-Kimura, S. D. (2022) Interactive effects of biochar, nitrogen, and phosphorous on the symbiotic performance, growth, and nutrient uptake of soybean (Glycine max L.). Agronomy 12, 1, 27.

Golicz, K., Bellingrath-Kimura, S. D., Breuer, L., Wartenberg, A. (2022) Carbon accounting in European agroforestry systems – key research gaps and data needs. Current Research in Environmental Sustainability 4, Article 100134.

Link to Website

DAKIS: *https//add-dakis.com/en/*.
ZALF: *https://www.zalf.de/en/page/ZALF.aspx*.

Commission 4.4 – Soil Education and Public Awareness

Chair: Cristine Muggler, Brazil
Vice Chair: Hideaki Hiram, Japan
This commission deals with teaching methods and the development of soil scientists – but also how soil-related knowledge is presented to other interested parties, as well as the information provided to the public and related general public awareness. A well informed public is needed so that the importance of soils is understood by all.

Events

- **International Soil Day 2021:** 780 events around the world (Asia=296; Africa=56; Australia/NewZealand=8; Europe=134; South America=137; Central America=121; North Amercia=28). Source: *https://www.fao.org/world-soil-day/worldwide-events/en/*. Even under still pandemic restrictions the number of events was high and significant. The soil education network around the world has been strengthened and consolidated year by year.
- **Japanese event:** A video introducing the soil monolith was made and distributed at the web site of the Japanese Society of Pedology (*http://pedology.jp/posts/post65.html*), because it was not possible to observe the soil in the fields of Japan. The introduction of the Soil Monolith on the web was conducted by R. Hirayama, K. Mori, K. Fujii, and M. Asano at the National Museum of Nature and Science.
- **X Brazilian Symposion on Soil Education:** The event was online (March 2-5, 2021), It was opened with the session „Soil Education present and future, how are we changing?" with speeches by Cristine Muggler (Soil education IUSS commission chair) and Lúcia Anjos (president of the Brazilian Soil Science Society)Palestra: Educação em Solos do hoje para o amanhã: como nos transformamos? X Simpósio Brasileiro de Educação em Solos: A voz dos invisíveis na sociedade e na academia, 2 a 5 de março de 2021, Juazeiro – BA, 05/03/2021.

Planned future activities

- During the conference taken place in Glasgow Scotland from 31 July to 5 August 2022, the research forum will be held. The outlines of the international guideline for soil education will be presented there to discuss the concept with distinguished scholars nurtured under each unique environmental and cultural conditions. This step might be characterized by scholarship dimension based on the four dimensions (Field et al. 2020).
- Also, a symposium related to soil education and public awareness is planned by Div. 9 (Soil Education and Cultural Soil Science) of JSSSPN and taken place in the conference of JSSSPN held in Tokyo from Sep 13 through 15 2022. The proposed title is "Aiming at nurturing one's sense to percept that soil is indispensable for their life and society. Let's consider the necessity of soil education."

Publications

Oliveira RF, Cardoso IM, Muggler CC, Pereira AJ & Carmo DL (2022) Agroecological pest and disease control: the result of action research in agrarian reform settlement, Agroecology and Sustainable Food Systems, 46:2, 165-180, DOI: *10.1080/21683565.2021.1983741*

Cardoso IM, Muggler CC, Mendonça MAFC, Silva, LH, Botelho MIV, Cruz NAC, Vassali FZ, Resende SEM, Fernandes GB, Barbosa W. Rural education and agroecology echo in Zona da Mata region of Minas Gerais, Brazil (Educação do campo e agroecologia ecoam na Zona da Mata Mineira). In: AM Haliski, KCSA Lopes, PR Lopes, RFS Jammal Padilha (orgs). Saber e fazer agroecológico. Editora CRV, Curitiba 2021. 186 p. DOI 10.24824/978652510851.3

R. Lal, J. Bouma, E. Brevik, L. Dawson, D. J. Field, B. Glaser, R. Hatano, A. E. Hartemink, T. Kosaki, B. Lascelles, C. Monger, C. C. Muggler, G. M. Ndzana, S. Norra, X. Pan, R. Paradelo, L. B. Reyes-Sánchez, T. Sandén, B. R. Singh, H. Spiegel, J. Yanai, J. Zhang. Soils and sustainable development goals of the United Nations: An International Union of Soil Sciences perspective, Geoderma Regional, 25, 2021. ISSN 2352-0094. *https://doi.org/10.1016/j.geodrs.2021.e00398*.

"*Educação em Solos no Brasil*" (Soil Education in Brazil). It is in final editing to publish the book "Educação em Solos no Brasil" (Soil Education in Brazil). The book is published by the Brazilian Soil Science Society. The book is composed of 15 chapters that range from the paths of soil education in Brazil to practice, outreach activities and methodologies used around the country to research strategies. The book editors are Fabiane Vezzani, Cristine Muggler, Marcelo Lima and Valentim Silva.

Commission 4.5 – History, Philosophy, and Sociology of Soil Science

Chair: Eric Brevik, USA
Vice Chair: Tom Sauer, USA
This Commission deals with our past. It links the study of what has happened in history and how soils can be used to help explain the past changes. This Commission is not just a record of history but the use and understanding of soil information and its relationship to human development and history.

Events

- Commission 4.5 collaborated with the Cultural Patterns Working Group to organize **Cultural understanding of soils. Results from an inter-cultural project** at the 2021 Eurosoil Conference. This session included presentations from the Cultural Understanding of Soils book project.

Recent activities

- Commission 4.5 collaborated with the Cultural Patterns Working Group to organize **Cultural understanding of soils. Results from an inter-cultural project** at the 2021 Eurosoil Conference. This session included presentations from the Cultural Understanding of Soils book project.
- Eric Brevik, Lorna Dawson, and Laura Bertha Reyes Sanchez presented their work on international gender equity in soil science at the 2021 EGU and SSSA meetings. This work was initiated as part of an IUSS project.

Planned future activities

- Commission 4.5 is cooperating with the Cultural Patterns of Soil Understanding Working Group (Nikola Patzel, chair) in developing a book on Soil Culture as part of the IUSS book series. All chapters are now complete and the files need to be sent to the publisher.
- Eric Brevik and Lorna Dawson are organizing a session "History, philosophy and sociology of soil science" for the 2022 WCSS in Glasgow.
- Laura Bertha Reyes Sánchez, Eric Brevik, and Lorna Dawson are organizing a session "How to move towards gender equity?" for the 2022 WCSS in Glasgow.
- Nikola Patzel and Sabine Grunwald are organizing a session "Culture and Soil. Outlook and insights from around the world" for the 2022 WCSS in Glasgow. This is being done in collaboration with Commission 4.5.

Publications
(related to various aspects of Division 4)

El-Ramady, Hassan, Eric C. Brevik, Heba Elbasiouny, Fathy Elbehiry, Ahmed El-Henawy, Salah E.-D. Faizy, Tamer Elsakhawy, Alaa El-Dein Omara, Megahed Amer, and Yahya Eid. 2021. Soils, Biofortification, and Human Health under COVID-19: Challenges and Opportunities. *Frontiers in Soil Science* 1:732971. doi: 10.3389/fsoil.2021.732971.

Brevik, Eric C., Yones Khaledian, and Hassan El-Ramady. 2021. Assessing the Complex Links Between Soils and Human Health: An Area of Pressing Need. *Frontiers in Soil Science* 1:731085. doi: 10.3389/fsoil.2021.731085.

El-Ramady, Hassan, Eric C. Brevik, Heba Elbasiouny, Fathy Elbehiry, Megahed Amer, Tamer Elsakhawy, Alaa El-Dein Omara, Ahmed A. Mosa, Ayman M. El-Ghamry, Neama Abdalla, Szilárd Rezes, Mai Elboraey, Ahmed Ezzat, and Yahya Eid. 2021. Planning for disposal of COVID-19 pandemic wastes in developing countries: A review of current challenges. *Environmental Monitoring and Assessment* 193:592. *https://doi.org/10.1007/s10661-021-09350-1*.

Elbehiry, Fathy, Heba Elbasiouny, Valérie Cappuyns, and Eric C. Brevik. 2021. Available concentrations of some potentially toxic and emerging contaminants in different soil orders in Egypt and assessment of soil pollution. *Journal of Soils and Sediments* 21:3645-3662. doi:10.1007/s11368-021-03021-x.

Mahler, Robert L., Maja Krzic, Bethann Garramon Merkle, Colby Moorberg, and Eric Brevik. 2021. Natural Sciences Education in a COVID-19 World. *Natural Sciences Education* 50:e20067.

Elbasiouny, Heba, Marwa Darwesh, Hala Elbeltagy, Fatma G. Abo-alhamd, Ahlam A. Amer, Mariam A. Elsegaiy, Israa A. Khattab, Esraa A. Elsharawy, Fathy Ebehiry, Hassan El-Ramady, and Eric C. Brevik. 2021. Ecofriendly Remediation Technologies for Wastewater Contaminated with Heavy Metals with Special Focus on Using Water Hyacinth and Black Tea Wastes: A Review. *Environmental Monitoring and Assessment* 193:449. Doi: 10.1007/s10661-021-09236-2.

Lal, Rattan, Johan Bouma, Eric Brevik, Lorna Dawson, Damien J. Field, Bruno Glaser, Ryusuke Hatano, Alfred Hartemink, Takashi Kosaki, Bruce Lascelles, Curtis Monger, Cristine Muggler, Georges Martial Ndzana, Stefan Norra, Xicai Pan, Remigio Paradelo, Laura Bertha Reyes-Sánchez, Taru Sandén, Bal Ram Singh, Heide Spiegel, Junta Yanai, and Jiabao Zhang. 2021. Soils and Sustainable Development Goals of the United Nations (New York, USA): An IUSS Perspective. *Geoderma Regional*. e00398. *https://doi.org/10.1016/j.geodrs.2021.e00398*.

Dawson, Lorna, Eric C. Brevik, and Laura Bertha Reyes-Sánchez. 2021. International gender equity in soil science. *European Journal of Soil Science* 72:1929-1939. DOI:10.1111/ejss.13118.

Silva-Parra, Amanda, Juan Manuel Trujillo-González, and Eric C. Brevik. 2021. Greenhouse gas balance and mitigation potential of agricultural systems in Colombia: A systematic analysis. Greenhouse Gases: *Science and Technology* 11:554–572. *https://doi.org/10.1002/(ISSN)2152-3878*.

Brevik, Eric C., April Ulery, and Amy Smith Muise. 2021. Pivoting to online laboratories due to COVID-19 using the "Science of Agriculture" digital tools: A case study. *Natural Sciences Education*. 50:e20045. *https://doi.org/10.1002/nse2.20045*.

Keshavarzi, Ali, Vinod Kumar, Güneş Ertunç, and Eric C. Brevik. 2021. Ecological Risk Assessment and Source Apportionment of Heavy Metals Contamination: An Appraisal Based on the Tellus Soil Survey. *Environmental Geochemistry and Health* 43(5): 2121-2142. *https://doi.org/10.1007/s10653-020-00787-w*.

Collier, David, and Eric C. Brevik. 2021. Soils and Human Health: Communication Between Soil Scientists and Health Care Providers. In: Rattan Lal (Ed.), *The Soil-Human Health-Nexus*. CRC Press, Boca Raton, FL. p. 59-80.

Pereg, Lily, Joshua J. Steffan, Csongor Gedeon, Phil Thomas, and Eric C. Brevik. 2021. Medical Geology of Soil Ecology. In: Malcolm Siegel, Olle Selinus, and Robert Finkelman (eds.). *Practical Applications of Medical Geology*. Springer, Cham. p. 343-401.

Presentations
(related to various aspects of Division 4)

Brevik, Eric C., Lorna Dawson, and Laura Bertha Reyes Sanchez. 2021. International Gender Equity in Soil Science: A Social Equity Issue. *Geophysical Research Abstracts*. EGU21-17.

Brevik, Eric C., Lindsey Slaughter, Bal Ram Singh, Joshua J. Steffan, David Collier, Paul Barnhart, and Paulo Pereira. 2021. Communicating the importance of soils to human health: New options and opportunities. *Global Symposium on Soil Biodiversity*.

Reyes-Sánchez, Laura Bertha, Eric C. Brevik, and Lorna Dawson. 2021. Gender equity in soil science: an international perspective. *Soil Science Society of America Annual Meeting Abstracts*.

Brevik, Eric C., Sabine Grunwald, and Jeffrey Homburg. 2021. Native American origin myths including soil or Earth: Prehistory to present. *Eurosoil* 2021, Geneva.

Working Group Cultural Patterns of Soil Understanding

Chair (GSM): Nikola Patzel, Austria
Vice Chair: Eric Brevik, USA

Recent activities

All active members of this working group, these are about 30 people, are amongst the 43 authors of our book on Cultural Understanding of soils. These colleagues put a lot of effort into their detailed case studies and other chapters on the topic. In the context of this, an intensive scientific exchange took place within and author teams and with the editors. The editors (Nikola Patzel, Sabine Grunwald, Eric Brevik, Christian Feller) are finalizing the editing for publication with Springer.
The working group also organized a session on soils and culture at the 2021 Eurosoil (virtual) meeting in Geneva, Switzerland.

Publications

Lal, Rattan, Johan Bouma, Eric Brevik, Lorna Dawson, Damien J. Field, Bruno Glaser, Ryusuke Hatano, Alfred Hartemink, Takashi Kosaki, Bruce Lascelles, Curtis Monger, Cristine Muggler, Georges Martial Ndzana, Stefan Norra, Xicai Pan, Remigio Paradelo, Laura Bertha Reyes-Sánchez, Taru Sandén, Bal Ram Singh, Heide Spiegel, Junta Yanai, and Jiabao Zhang. 2021. Soils and Sustainable Development Goals of the United Nations (New York, USA): An IUSS Perspective. Geoderma Regional. e00398. *https://doi.org/10.1016/j.geodrs.2021.e00398*.

Dawson, Lorna, Eric C. Brevik, and Laura Bertha Reyes-Sánchez. 2021. International gender equity in soil science. European Journal of Soil Science 72:1929-1939. DOI:10.1111/ejss.13118.

Homburg, Jeffrey, Sabine Grunwald, and Eric C. Brevik. From Native American tradition to modern day America, Native origin legends that involve soil and Earth. In: Nikola Patzel, Sabine Grunwald, Eric C. Brevik, and Christian Feller (Eds), Cultural Understanding of Soil. Springer, Cham. in press.

Brevik, Eric C., Damien Field, Jacqueline Hannam, Maja Krzic, Rainer Horn, Cristine Muggler, Jude Odhiambo, Yoshitaka Uchida, Danny Itkin, Hong-sheng Wu, Liana Pozza, Laura Bertha Reyes Sánchez, and Thomas Scholten. Degrees pursued by students in different countries to train for careers in soil science. In: Nikola Patzel, Sabine Grunwald, Eric C. Brevik, and Christian Feller (Eds), Cultural Understanding of Soil. Springer, Cham. in press.

Collier, David, and Eric C. Brevik. 2021. Soils and Human Health: Communication Between Soil Scientists and Health Care Providers. In: Rattan Lal (Ed.), The Soil-Human Health-Nexus. CRC Press, Boca Raton, FL. p. 59-80.

Presentations

Brevik, Eric C., Lorna Dawson, and Laura Bertha Reyes Sanchez. 2021. International Gender Equity in Soil Science: A Social Equity Issue. Geophysical Research Abstracts. EGU21-17.

Reyes-Sánchez, Laura Bertha, Eric C. Brevik, and Lorna Dawson. 2021. Gender equity in soil science: an international perspective. Soil Science Society of America Annual Meeting Abstracts.

Brevik, Eric C., Sabine Grunwald, and Jeffrey Homburg. 2021. Native American origin myths including soil or Earth: Prehistory to present. Eurosoil 2021, Geneva.

International Decade of Soils

(2015-2024)

World Soil Day 2021

World Soil Day-2021 at ICAR-Indian Agricultural Research Institute, Gauria Karma, Hazaribag, Jharkhand, India

By Preeti Singh1, Manoj Chaudhary, Dipak Gupta, Santosh Kumar; Corresponding author: singh.preeti8888@gmail.com.*

The ICAR- Indian Agricultural Research Institute, Gauria Karma, Jharkhand, India celebrated the **World Soil Day – 2021** on the Theme – **"Halt Soil Salinization, Boost Soil Productivity"**. The Soil Scientist, Dr. Preeti Singh, highlighted the ways in which every person at individual level has to act to protect and can make the soil healthy. She also emphasized on the importance of Soil Health Cards for maintaining healthy soil for the benefits of the future generations. She also apprised the farmers about the Crop Residue Management and Rain Water Harvesting. Earlier, delivering the welcome address, scientists Dr. Manoj Chaudhary and Dr. Dipak Gupta stressed the inclusive development of soil. They also accentuated the importance of Soil Salinization and Soil Acidity for crop productivity and their management with the application of proper quantity of gypsum and lime in salt-affected and acid soils, respectively.

The organizer, Dr. Santosh Kumar, Scientist, ICAR-IARI, Jharkhand urged the use of balanced fertilizers and insecticides in soil for crop production. The event registered participation of 150 farmers and 12 M.Sc. Agriculture Students; 15 scientists and Institute's Staff Members of ICAR-IARI, Jharkhand.

Dr. Preeti Singh interacts with the farmers (© Dr. Preeti Singh, Scientist, ICAR-IARI, Jharkhand)

Celebrating World Soil Day 2021 (© Dr. Preeti Singh, Scientist, ICAR-IARI, Jharkhand)

Stop Soil Degradation and the IUSS educative project to achieve it

On December 5th 2015, celebrating the World Soil Day and the International Year of the Soils, the International Union of Soil Sciences, through the Vienna Declaration, launched the "International Decade of Soils: 2015- 2024[1]", defining as two of its most important tasks to stop the land degradation on our planet, and to put the main focus of our activities on school-age children[2] to achieve it.
In line with these main goals, on World Soil Day, December 5, 2020, the IUSS launched the Project "THE IUSS GOES TO THE SCHOOL" with the objective of informing children and young people about the importance of the soil resource in our lives and the urgency to protect it.

[1] Horn, R. WSD 2015, Vienna and 2017, Rome, Italy.
[2] International Decade of Soils Programme. 2016. IUSS Inter-Congress Meeting Document, p.121-123.

Argentinean Association of Soil Science

On the occasion of World Women's Day, the Argentine Association of Soil Science organized a discussion of "Mujeres-Sueleras (Women in Soil Science)", which was held on the AACS YouTube channel with the participation of the IUSS President through a video. March, 8 at 6 p. m. Argentinean time.
Watch the video: *https://www.youtube.com/channel/UCWnQXve6o4Dv2NnL2FC6t6Q.*
#MujeresSueleras #Mujeres EnCiencia #TheSoilIsLif

Above: Discussion of Women in Soil Science.
Below: Poster announcing Soil Conservation Day (both: © AACS)

The Soil Science Education Commission of the Argentine Association of Soil Science invites you to celebrate ***Soil Conservation Day on July*** *14* at 11 a.m., which will present children's books on soil salinity that several of its members have written. *http://www.fca.unju.edu.ar/extension/noticias/realizaran-jornada-de-celebracion-por-el-dia-de-la-conservacion-del-soil-7-de-julio/*.

Institute of Geology, UNAM, Mexico

Soil sciences, fertile ground for the development of female scientists in Mexico: Conversation celebrating International Women's Day.

Annnouncement of the discussion 'Soil sciences, fertile ground for the development of female scientists in Mexico' (© UNAM)

Spanish Soil Science Society

On the occasion of the International Day of Women and Girls in Science, at the Documentation Center for Water and the Environment in Zaragoza, Spain, two experiences were presented for the students: a) the Escape Room "Perfilina" by Carmen Castañeda deñ CSIC and b) the Workshop What is Soil Science? presenting soil experiments for children, which is a workshop coordinated by David Badía (IUCA-Unizar), and Andoni Alfaro, Ana Paula Conte and Alejandra Jiménez as collaborators.

Being Huesca, Spain, a land of cultivation and tillage, David Badía and Carlos Orús investigate the innovative agricultural and tourist techniques as ways of generating knowledge and awareness.
Read more: *https://www.diariodelaltoaragon.es/noticias/comarcas/2022/02/27/el-valor-del-suelo-...-1556161-daa.html*.

Escape Room "Perfilina" (© Dr. David Badía)

Pictures from the Workshop 'What is Soil Science' (both: © Dr. David Badía)

Conference and Meeting Reports

Report of the Field Workshop and the 6th International Congress of Soil Classification

March 25 to April 1, 2022.

By Norma Eugenia García Calderón,

The Congress was held within the framework of the activities of Commission 1.4 of Division I of the International Union of Soil Science Societies (IUSS). The participation of four fellows in the Field Workshop and in the conferences was made possible through the IUSS Stimulus Fund. In addition, we have the support of Division I for the printing of the Field Guide. The logistics of the tour and the facilities of the conferences and post-congress courses were supported by: the Faculty of Sciences and the Multidisciplinary Teaching and Research Unit of Juriquilla and the Cultural Academic Center of the UNAM-Querétaro Campus; the Environmental Geography Research Center from Morelia Campus of the National Autonomous University of Mexico; the Edaphology Program of the Postgraduate College-Montecillos and CP-*Campus* San Luís Potosí; the Autonomous University of Nuevo León; and, The Institute of Statistics and Geography (INEGI). The organizing Committee was established at the beginning of 2019, and its activities began with the field workshop participants from the Department of Edaphology, INEGI were in charge of the mapping, the three soil sampling campaigns; also soil physical and chemical analysis, together with the UMDI-J participants. The CP Group sampled the cores for the study of micromorphology, and the profiles for the monoliths (Figures 1 and 2), as well as the mineralogy analysis by X-ray diffraction.

Figure 1 (left): Sampling cores for micromorphology
Figure 2 (right): Obtaining the monolith profile in Gypsum Dunes (both: © Marcin Switoniak)

The X-ray fluorescence and color mapping was performed by the CIGA-UNAM participants, among all the study of the morphology of the profiles was carried out, with all this information discussed within the members of the Committee, the Field Workshop guide was prepared for the participants (Figure 3). We never imagined that it would be deferred for so long due to the Covid confinement, the activities of the organization were gradually resumed over the course of the previous year, changing the format of the conferences to hybrid form. In this context, 13 conferences were face-to-face and ten were given virtually.

Figure 3: Participants of the Field Workshop discussing the Gypsisol of Vanegas, SLP (© Marcin Switoniak)

Organizing Committee

- Norma Eugenia García Calderón
- Chairman, National Autonomous University of Mexico (UNAM)
- Ma. del Carmen Gutiérrez Castorena
- Vice Chairman, Postgraduate College (CP), Montecillo, México
- Elizabeth Fuentes Romero, Xochitl Tapia Sánchez, Martha Daniela Bobadilla Ballesteros from UMDI-Juriquilla, Faculty of Sciences, UNAM
- Alejandro Roberto Ibelles Navarro Dean of the Soil Science Department of National Institute of Statistics and Geography (INEGI)
- Edgar Vladimir Gutiérrez Castorena Autonomous University of Nuevo León (UANL)
- Francisco Bautista Zúñiga, Dante López Carmona from the Environmental Geography Research Center (CIGA), *Campus* Morelia (UNAM)
- Juan Felipe Martínez Montoya, *Campus* El Salado, CP, San Luís Potosí
- Marcos Rolfi Pérez Pérez and Carlos Ricardo Ramírez Pérez (INEGI)
- Patricio Sánchez Guzmán, Gabriel Alejandro Hernández Vallecillo, Sandra Montserrat Barragán Maravilla and Ricardo González Zavaleta from Postgraduate College, *Campus* Montecillo

CONFERENCE – March 30 to April 1

Scientific Committee

The scientific committee carried out the review and arbitration of the abstracts received for the congress conferences from 2019.

Carlos Alberto Ortiz Solorio	Colegio de Postgraduados, México
Cornie van Huyssteen	University of Free State, South Africa
Curtis Monger	University of Arizona, USA
Elizabeth Solleiro Rebolledo	Universidad Nacional Autónoma de México
Erika Micheli	Szent Itsvan University, Hungary
Karl Stahr	Germany
John Galbraith	Virginia Tech, United States
Lúcia dos Anjos	Universidade Federal Rural de Rio de Janeiro, Brazil
Maria I. Gerasimova	Russian Academy of Sciences, Russia
Megan Balks	Waikato University, New Zealand
Peter Schad	Technological University of Munich, Germany
Sergey V. Goryachin	Russia
Stephan Mantel	International Soil Reference and Information Center, Netherlands

The inauguration of the congress was in charge of Dr. Laura Bertha Reyes, President of the IUSS. The inaugural lecture was presented by Dr. Erika Micheli who brilliantly spoke about *Major steps in the development of soil classification.* (Figure 4).

Figure 4: Opening lecture by Erika Micheli

The main congress issues were

New contributions in soil classifications; Impact of soil functions on soil classification; Anthrosols and Technosols, some challenges for their classification (Figure 5); Innovative tools in soil classification and Salinization dynamic and soil classification.

Figure 5: J. Galbraith and L. Medina during poster session discussion (both: © Arturo Erubiel Hernández)

Starting with the first one nine oral contributions and three posters; the second topic was presented in five oral contributions and four posters, the third topic in one oral and one poster, the fourth topic consisted of three oral and one poster; the fifth topic was presented in two posters.

Four key lectures of each issue by John Galbraith splendidly presented *Explaining the New Soil Order in Soil Taxonomy*; Curtis Monger talk about *Soil Taxonomy and the philosophy of John Stuart Mill* and Peter Schad led us to *On the way to the fourth edition of the WRB, 2022*, on Friday the conference was given by Pavel Krasilnikov *The splendors and miseries of numerical soil classifications.*

The donation of ten monoliths of the profiles of the Field Workshop was obtained from Dr. Carlos Alberto Otriz Solorio and the participants of the Postgraduate College, which were exhibited in the lobby of the "Flavio Mena" Cultural Academic Center (CAC) (Figure 6). The congress conferences were presented in person and virtually in the CAC theater. All the conferences were broadcasted and recorded with the support of Adrián Orozco Gutiérrez, head of the CIGA Science Communication Unit. As post-congress workshops, the XII International Workshop on Soil Classification and the V International Workshop on Soil Quality Indicators "Organic matter and hydrology in the protection of soil resources" were held from April 4 to 9. Our appreciation to Arturo Erubiel Hernández Tirado for the drone flights to record the sites of the first campaign and the photographs, as well as for the translation during the conferences.

I believe that together with the rest of the activities and materials, the purpose of improving communication for a better quality of life, proposed as the motto of this sixth edition of the Congress, has been achieved.

Also, Field Workshop Guide and the abstracts of the conference are published in the congress website *https://iscc2020.org/*. And the conferences were uploaded to facebook and youtube, and are available to those interested, as examples we have these *https://www.youtube.com/watch?v=c4IdCHWM0vs*, *https://www.youtube.com/watch?v=U9yhXF2PTDU* and *https://www.youtube.com/watch?v=smx-aZQ45jw*.

Figure 6: Monolith exhibition (© Arturo Erubiel Hernández)

SPONSORS

FIELD WORKSHOP – March 24 to 29

Friday March 25	Cuatro Ciénegas, Coahuila | Almaguer Lira, Dunas de Yeso y Rio Mezquites
Saturday March 26	Arteaga, Coahuila | Perfil Sierra Hermosa | Galeana, Nuevo León | Perfil Corona del Rosal
Sunday March 27	Linares, Nuevo León: perfil del CIPA | San Luís Potosí (SLP): Perfil El Gallo, San Vicente Vanegas Perfil Rancho Nuevo, Matehuala
Monday March 28	San Luís Potosí (SLP): Perfil Ojo de Agua, Zaragoza | Perfil El Charco Salado, Rioverde
Tuesday March 29	Querétaro: Perfil Pinal de Amoles, Sierra Gorda de Querétaro | Perfil La Laja, Camargo, Peñamiller

With 32 participants from 11 countries, including four awarded scholarships of Argentina, Andrés Jesús Tarditti; Brazil, Yuri Andrés Gelsleichter and México, Axel Cerón and Vicente Vidal Ercinia Uribe all are graduate students. And as responsible, eight members of the organizing committee (CP, INEGI, UANL, UNAM) (Figure 7).

Figure 7: Participants in the Gypsum Dunes, Cuatro Ciénegas (© Marcin Switoniak)

The tour covered a large part of the "Sierra Madre Oriental (SMO)" Physiographic Province, beginning in the buffer zone of the Cuatro Cienegas Biosphere Reserve, also declared a Natural Area for the Protection of Flora and Fauna due to its environmental importance. Further crossing to the Province of the Coastal Plain of the North Gulf to the Agricultural Research and Production Center of the UANL in Linares and returning to the Sierras and Western Plains of the SMO through the Iturbide Canyon to reach San Vicente Vanegas in the north of the state of San Luís Potosí, within the Prairie Dog protection area. Then we headed to Matehuala, to continue the workshop in the Sierra de Álvarez Natural Protected Area in the Valley of the Ghosts area. The day ended at the SLP tour in Rioverde located in the Coastal Plain of the North Gulf. Further the town of Conca in Arroyo Seco was reached and continued to the Northeast of the buffer zone of the Sierra Gorda de Querétaro Biosphere Reserve and the Querétaro semi-desert to culminate the workshop in Juriquilla, Querétaro. The itinerary was 1,700 km of intense work and discussion during these five days.

The analyzed soils have been formed from alluvial sediments of gypsum and calcareous rocks, in a hyperarid climate within this region of the Chihuahuan Desert.
The profile was classified as Calcic Katogypsic Solonchak (Epiraptic, Evapocrustic Hypersalic Ochric, Pantosiltic, Sulfatic, Takiriric) by WRB; and by Soil Taxonomy as Ustic Calcigypsid fine-silty, mixed, hyperthermic.
In the core zone, the evaporitic origin soils form the field of Gypsum Dunes with gypsophilous vegetation that, together with the biological crusts, slightly attenuate the movement of the dunes. the representative profile were Haplic Gypsisol (Aeolic, Hypergypsiric, Ochric, Pantoarenic) according to the WRB; and through the Soil Taxonomy: Typic Torripsament hypergypsic, hyperthermic. Within this endorheic basin, the Poza Azul was visited with remnants of stromatolites. The workshop continued within this region in the Mezquite River profile classified by the WRB as Fluvic Gypsic Solonchak (Evapocrustic, Ochric, Oxyaquic), corresponding to a Gypsic Aquisalid coarse-loamy, hypergypsic, thermic. However, the abundance of gypsum polymorphs according to Haplic Gypsisol (Arenic, Gleyic Hypergypsic) WRB micromorphology analysis and as a Typic Haplogypsid (Typic Torripsaments).
The second day we moved to the Sierra de Arteaga, the Sierra Hermosa Profile was discussed, which corresponds to: Luvic Vertic Endocalcic Phaeozem (Chromic, Epiraptic, Katoclayic) according to WRB. The classification according to Soil Taxonomy is: Torrertic Haplustalfs fine, smectitic, thermic.
At Galeana municipality, in the south of the state of Nuevo León. The Corona del Rosal Profile was shown almost at nightfall, and was classified by WRB as Petrocalcic Chernozem (Clayic) and by Soil Taxonomy as Petrocalcic Argiustoll, Fine, mixed and thermic.
At the beginning of the third day, the UANL Agricultural Production Research Center (CIPA) discussed the profile classified by the WRB as Calcic Chernozem (Aric, Pantoclayic, Protovertic) in a vineyard crop; and its corresponding denotation by the Soil Taxonomy was Pachic Calciustoll, fine, smectitic, hyperthermic. In a nearby site, a Calcic Vertisol equivalent to a Torrertic Calciustoll was observed.
The following profile at El Gallo, San Vicente Vanegas, SLP, was classified by the WRB as Haplic Gipsisol (Gypsiric, Ochric, Siltic) and by Soil Taxonomy as: Typic Haplogypsid, Coarse-Silty, Hypergypsic and Thermic.
In Matehuala, the Rancho Nuevo profile was classified as Katopetric Gypsisol (Anosiltic, Gypsiric, Ochric), in Soil Taxonomy as: Ustic Petrogypsid Fine-Silty, Hypergypsic and Thermic.
On the fourth day at the Sierra de Álvarez Protected Natural Area, the Ojo de Agua profile corresponds to a Chromic Vertisol (Amphiraptic, Humic, Luvic, Mesotrophic, Skeletic) by the WRB and by Soil Taxonomy it corresponds to a Vertic Paleustalf, Fine, Smectitic and Mesic (Figure 8). Afterwards, in Rioverde, the Charco Salado profile was discussed, locating it according to the WRB Haplic Phaeozem (Gypsic, Pantosiltic) and as: Gypsic Calciustoll. Coarse-silty, Gypsic and Hyperthermic.
The last day of the tour began in the municipality of Arroyo Seco located in the Carso Huasteco subprovince of the SMO. The Concá Mission built in the 18th century by Fray Junípero Serra, declared a World Heritage Site by UNESCO in 2003, was visited. Continuing towards the penultimate profile of the workshop located in a forest plantation of Ejido El Madroño, its classification according to the WRB was Haplic Alisol (Cutanic, Epiraptic, Episiltic, Humic, Katoclayic, Protostagnic) and Typic Paleudult, fine, mixed and isothermic.
The last site within the limits of the Carso Huasteco and the Mesa del Centro in Camargo, is part of the Queretaro semi-desert, is located in the La Laja mercury mine, the profile in an agricultural plot was classified according to the WRB: Somerirendsic, Skeletic, Leptosol (Loamic), by Soil Taxonomy as: Lithic Torriorthents. Fine-loamy, Mixed, Isothermic. The surrounding soil made up of tailings and calcine artifacts from the mine was classified as: Spolic Technosols (Aridic, Transportic).
In soil classification, it is convenient to show in a simple way the evolution of the planet and the adaptations that have been experienced throughout the geological eras. All this information has been used to generate increasingly precise soil databases which can be useful for forcasting changes in the future as well as the progress of cartography. Together with the progress in all the subdisciplines that make up Soil Science, this is translated into the ability to update cartography at the most appropriate scales to show it to academics, students and decision makers involved in planning the proper management of the soil resource.
On behalf of the organizing committee of the congress, I thank the support of national and international institutions to carry out the various events of this VI edition of the Congress, after overcoming the restrictions and complex conditions that the worldwide dissemination of the multiple variants of SARS-COV2 has challenged us.

NOTE

The reports of two scholarships are included: Andrés Jesús Tarditti (Argentina) and Axel Cerón (México); the other fellowships supported were Yuri Andrés Gelsleichter (Brazil) and México, Vicente Vidal Ercinia Uribe (UANL), actually all of them are graduate students.

Figure 8: Discussion between P. Sánchez and C. Monger (© Marcin Switoniak)

4th International Conference of Young Scientists

29 May – 1 June 2022, Toruń (Poland)

By Dr. Bartłomiej Glina, Head of the Organizing Committee
Read more: *https://sites.google.com/view/site-torun-2020*.

Final Report

The 4th edition of the Soil in the Environment conference was attended by 35 young soil scientists from 12 countries (China, Croatia, Czech Republic, Ethiopia, India, Iran, Nigeria, Pakistan, Poland, Portugal, Switzerland and Vietnam). Six participants from low-income and lower-middle-income countries (India, Iran, Nigeria and Pakistan) received the participation grant funded by the IUSS Stimulus Fund (300 $). The conference was organized by Young Soil Scientists from the Nicolaus Copernicus University in Toruń and Poznań University of Life Sciences. It was an honour for Organizers and Participants that the conference was attended by Prof. Laura Bertha Reyes Sánchez, President of the International Union of Soil Sciences.

1st day of the conference (29 May)

During the first day of the conference participants arrived to the conference venue (Hotel Przystanek in Toruń) in the afternoon. After the registration process from 16 to 19 pm, all participants took part in the get together meeting. They were officially welcomed by the conference organizers and then had the opportunity to get to know other conference participants.

2nd day of the conference (30 May)

The official opening ceremony started at 9 am. The official welcome speeches were given by Prof. Laura Bertha Reyes Sánchez (President of the IUSS) and Dr Bartłomiej Glina (the Head of the Organizing Committee). Then, two opening lectures were given by Prof. Marcin Świtoniak (Nicolaus Copernicus University in Toruń) and Prof. Łukasz Uzarowicz (Warsaw University of Life Sciences). After the opening ceremony 3 plenary sessions and 1 poster session took place, during which in total 21 talks and 11 posters have been presented. All presentations had been evaluated by the Scientific Committee members. The second day of the conference ended with the gala dinner.

3rd day of the conference (31 May)

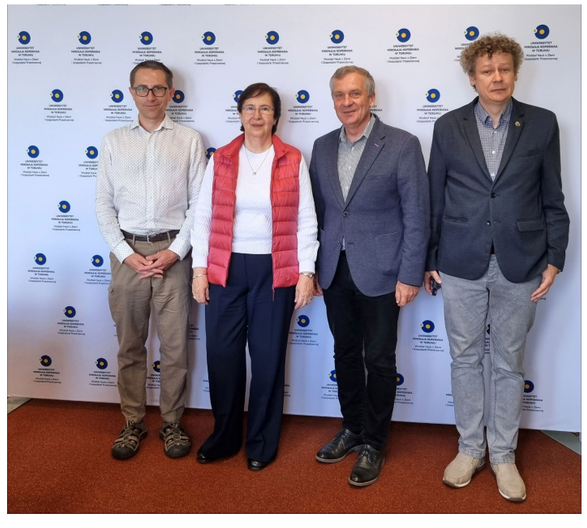
The day started very early in the morning. Just after breakfast all participants went by chartered bus to Brodnica Landscape Park. The field session was led by Prof. Marcin Świtoniak from Nicolaus Copernicus University in Toruń, who described the unique Young glacial landscape with special focus on the soil cover. Participants had possibility to see three soil profiles and discuss their genesis and classification, according to World Reference Base for Soil Resources. Soils were classified as Brunic Arenosol (profile 1), Mollic Gleysol (profile 2) and Fluvic Gleysol (profile 3). This was followed by a kayak trip from Tama Brodzka through the Skarlanka and Drwęca rivers directly to the town of Brodnica (ca. 10-11 km). Throughout the trip, Prof. Marcin Świtoniak talked about the unique values of surrounding landscapes. At the end of the day conference participants took part in the grill-barbecue dinner at the Hotel Ryte Błota & Spa. After a great evening, we returned to the Hotel Przystanek at about 11 pm.

4th day of the conference (1 June)

At the last conference day the closing ceremony started at 10 am. During the first part of the ceremony the best oral and poster presentations were awarded. The following participants have been awarded in the oral session: Tianjing Ren – China (1st place), Alda Vieira – Portugal (2nd place), Nina Hećej – Croatia (3rd place). In the poster session following participants have been awarded: Bogusława Kruczkowska – Poland (1st place), Amisalu Misebo – Ethiopia (2nd place), Hanna Radziuk – Poland (3rd place). Additionally the scientific committee of the conference awarded two honourable mention in oral and poster session, which goes to Allesandra Musso (Switzerland) and Arkadiusz Warczyk (Poland), respectively. In the second part of the ceremony the Head of the Organizing Committee expressed his appreciation to the Organizing Committee member for their great contribution in conference organization. At the end of speech all participants were encourage to take part in the next, 5th edition of the SITE conference which will take place in 2024 in Warsaw. Then the conference was officially closed by the President of the International Union of Soil Sciences – Prof. Laura Bertha Reyes Sánchez. The President of the IUSS expressed her appreciation for the high scientific level of presented talks and posters. In her summary, she mentioned that the activity of young people is very important for the future of the IUSS, thus such initiative like the SITE conference, in which people from all over the world participated, are very important and proof that such initiatives needed to be supported in the future.

Below a few pictures from the 4th International Conference of Young Scientists:

Awardees with IUSSPresident and Organizing Committee (© Bartlomiej Glina)



Copernicus University in Torún (© Bartlomiej Glina)

Group photo field trip, soil profile 3 (© Bartlomiej Glina)

Goup photo SITE 2022 (© Bartlomiej Glina)

Scientific and cultural days of Imola

21-23 June 2022, Palazzo Vespignani, Imola (Italy)

By William Trenti, Chiara Poesio and Marco Rossi

From June 21 to June 23, the Scientific and cultural days of Imola, Italy, took place. This year's topics were **"Rural Landscapes, Land Suitability and Excellence of Agricultural Production"**. The event saw the collaboration of several eminent institutions, such as the Italian National Academy of Agriculture, the Department of Agri-Food Sciences and Technologies of the University of Bologna, the International Union of Soil Sciences, the European Society for Soil Conservation, as well as the national Societies regarding Pedology and Soil Sciences and the Academic institutions, and saw the participation of professors, researchers, professionals, companies, and university students, who actively participated to the discussions. Over three days, thirty contributions were presented, offering interesting insights that ranged from the role of soil in defining the rural landscape, historical changes that shaped the Italian countryside and the impact of new policies; from the definition of land suitability to the opportunities that this approach offers in facing current and future challenges; and finally shone a well-deserved spotlight on excellent products and agricultural practices. The spirit of the Scientific and Cultural days peaked during the tour to a historical rural landscape, namely the lands of the Lamone River, in the province of Ravenna. Once part of a complex territorial system of rivers and wetlands, the area became renowned for the craftsmanship of marsh grasses. The traditions and know-how of this heritage still thrive thanks to the local Ecomuseum and cultural association. The tour will be part of the excursions that accompany the next celebration of the Centennial of the IUSS in Italy in May 2024 (*www.centennialiuss2024.org*).

The workshop was concluded by a panel discussion between the representatives of some of the most important Academies in the Italian scientific domain, focusing on the role of Academic institutions in assessing the quality of scientific information. A more thorough collaboration with the journalistic sector was deemed necessary to guarantee that the public receives such information in an accessible yet accurate way.

All the people and institutions that participated in this event contributed to enhancing the appreciation of rural landscapes, land suitability and agricultural practices as tools to pursue sustainable and high-quality agricultural production, which is a concrete way to assure soil security and achieve the sustainable development goals.

Right: Soil profile in the interdunal wetlands close to the Adriatic sea, Emilia, Italy. Left: Stark contrast between the traditional rural landscape of wetlands and the recent industrial developments (both: © Edoardo A.C. Costantini)

IUSS Alerts

December 2021 – May 2022

Information for and from the global soil science community

IUSS Alerts are e-mailed to more than 3,000 individual subscribers and 80 national soil science societies globally. Please forward the IUSS Alerts to your friends and colleagues. Send information for IUSS Alerts to *iuss@umweltbundesamt.at*. Below are still relevant contributions that appeared in the IUSS Alerts between December 2021 and May 2022.

Wageningen University Soil Science cluster website launched

The website was launched on the occasion of the World Soil Day on the 5th December 2021. The website will be a good opportunity to reach out to a broad audience showcasing our research (research lines, projects, publications.), education, collaboration and outreach. In addition, it will be an important place where you can find news and information about activities of the cluster including Research Lines working groups meetings and courses.
Link to the website: *www.wur.eu/ssc*.

Snapshot of the FEBR Soil Data Repository

The Free Brazilian Repository for Open Soil Data (FEBR) published the snapshot of soil data.
The dataset is standardized and harmonized and therefore ready for immediate use (analysis-ready) by the community.
The dataset can be downloaded from *https://cloud.utfpr.edu.br/index.php/s/akjtYo6JWdHDkI4*.
Read more: *https://www.pedometria.org/en/postagem/december-2021-snapshot-of-the-soil-data-repository/*.

Global Soil Museum Network

The Global Soil Museum Network is a collection of organizations who display soil and teach about its properties and importance to the general public.
Please fill out this form to indicate your interest in joining the network: Global Soil Museum Registration *Form*.
Read more: *Soils exposed*.

Taking soils for granted: how over-exploitation of this non-renewable resource poses a grave threat to our future

This blog, in the backdrop of World Soil Day, 2021, is a gentle reminder of the importance of practicing sustainable land management. Well-framed policies and extension functionaries capable of educating farmers on sustainable soil management are absolutely necessary to protect soils, opine Trisha Roy, Gopal Kumar and M Madhu in this blog.
Read more: *https://www.aesanetwork.org/blog-164-taking-soils-for-granted-how-over-exploitation-of-this-non-renewable-resource-poses-a-grave-threat-to-our-future/*.

Soil salinity in paddy fields of Sri Lanka and best practices to avoid crop failures due to soil salinity

'Halt soil salinization, Boost soil productivity' is the theme of this year's World Soil Day (5 December). Increasing soil salinity is adversely affecting agricultural production in Sri Lanka. In this blog, DN Sirisena and WADP Wanigsundera discuss the challenges Sri Lankan farmers face due to increasing soil salinity, and ways of addressing these.
Read more: *https://www.aesanetwork.org/blog-165-soil-salinity-in-paddy-fields-of-sri-lanka-and-best-practices-to-avoid-crop-failures-due-to-soil-salinity/*.

Adoption of Sustainable Land Management (SLM) to halt soil salinization in Bangladesh coastal region

"Halt soil salinization, boost soil productivity" is the theme of this year's World Soil Day (5 December). As a country with a large coastline, saltwater intrusion has significant adverse impacts in Bangladesh. To address the land degradation due to salinization, the country should adopt a strategy for sustainable land management, opine Dr Jalal Uddin Md. Shoaib.
Read more: *https://www.aesanetwork.org/blog-166-adoption-of-sustainable-land-management-slm-to-halt-salinization-in-bangladesh-coastal-region/*.
More information on the AESA (Agricultural Extension in South Asia) Network *https://www.aesanetwork.org/*, which is a sub-regional network of GFRAS (Global Forum for Rural Advisory Services)

Soil salinity

Halophytes are plants which can live, grow, and multiply in saline and sodic conditions. They can even rehabilitate salt-affected soils!
Learn more about soil salinity *http://tiny.cc/jkemuz*.

What drives roots' decomposition and carbon storage in grassland soils?

You most likely know that roots are important for grasses to grow, but the roots help do other things, too. They build soil carbon and support other life forms in soil. But did you know that various management tactics can force grass roots to break down, decompose, and add to the stored *carbon* pool in soil?
https://soilsmatter.wordpress.com/2021/11/01/what-drives-roots-decomposition-and-carbon-storage-in-grassland-soils/.

A 'debt' based approach to land degradation as an indicator of global change

"We propose a way to synthesize different approaches to global map land degradation by combining vegetation and soil indicators into a consistent framework for assessing land degradation as an environmental 'debt'. Our combined approach reveals a broader lens for land degradation through global change, in particular, identifying hot-spots for the different kinds of land degradation."
https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.15830?campaign=wolearlyview&fbclid=IwAR1Qgeuv7e-G8p0NqT9xQMtc9yIyIu7UC4caMoi1_ZHT-Dl5QP0CpD2UifU&utm_sq=gu9ln6bmdu.

News from the International Science Council (ISC)

Under the ISC project 'Science and the Sendai Framework for Disaster Risk Reduction', the **Global Risks Perceptions Report 2021** was launched, reporting on the global risk perceptions of leaders from business, economics, and government. The publication aims to contribute to the discourse that has been shaped through the respective work of the World Economic Forum and to spark dialogue, identify knowledge gaps, and support the growth of a multi-sectoral scientific community working to better understand and provide solutions to global risks.
Read more: *https://council.science/current/news/global-risks-perceptions-report-2021-released/*.
Access and share the report: *https://council.science/publications/global-risks-perceptions-report-2021/*.
Secondly, **'A Framework for Global Science in Support of Risk-informed Sustainable Development and Planetary Health'** was published in early December. The document takes stock of recent developments in disaster risk science and provides a compelling set of directions for research and scientific collaboration for a more holistic and collaborative approach to understanding and managing risks.
Read more: *https://council.science/publications/risk-informed-sustainable-development-planetary-health/*.

Launch of the ISC Global Commission on Science Missions for Sustainability

Political leaders, scientists, and influential personalities have issued an emergency warning on sustainability inaction by establishing a Global Commission to mobilize a $100 million a year global fund for Sustainability Science Missions – this will be a key priority for the ISC in the coming years, and is one of the outputs from the ISC Global Forum of Funders initiative and its report 'Unleashing Science'. The Commission of more than twenty high-level committed thought leaders will be chaired by Irina Bokova, former UNESCO Director-General, and Helen Clark, former Prime Minister of New Zealand and previous administrator of the UNDP.
Access and share the press release: *https://council.science/current/press/sustainability-missions/*.
Explore the multimedia portal 'Unleashing Science – Delivering Missions for Sustainability':
https://stories.council.science/unleashing-science/.
Read the report: *https://council.science/Commission/Report*.
[From ISC Update on December 10, 2021]

Launch of the CFRS paper 'A contemporary perspective on the free and responsible practice of science in the 21st Century'

We invite you to read a letter to ISC Members from the ISC Vice-President for Freedom and Responsibility in Science, Professor Anne Husebekk: *https://council.science/wp-content/uploads/2020/06/Letter-to-ISC-Members_10-December-2021.pdf*.
On the occasion of International Human Rights Day (10 December), the ISC's Committee for Freedom and Responsibility in Science (CFRS) has published the Discussion Paper "A contemporary perspective on the free and responsible practice of science in the 21st century". The Paper is intended for a broad readership, including researchers, research managers, policymakers, science diplomats, and those in the private sector. We invite all ISC Members to read, share and discuss the publication with all those in your network who have a role to play in upholding the free and responsible practice of science in contemporary society.
Access and share the press release: *https://council.science/current/news/researchers-combat-new-threats-to-key-human-rights/*.
Access the paper and explore the multimedia portal: *https://stories.council.science/science-freedom-responsibility/*.
[From ISC Update on December 10, 2021]

ISC 2022-2024 Action Plan published

We thank all of our Members for your input and feedback on the draft 2022-2024 Action Plan, which was adopted by the ISC membership at the 2nd ISC General Assembly in October. "Science and Society in Transition" sets out the framework of ISC activities over the next three years, outlining five priority domains. The document is now available online, including a print-friendly version, and we very much look forward to implementing the plan together with our Members.
Access the Action Plan: *https://council.science/publications/action-plan-2022-2024/*.
[From ISC Update on December 10, 2021]

International Year of Basic Sciences for Sustainable Development proclaimed

On 2 December, the United Nations General Assembly adopted a resolution proclaiming 2022 the International Year of Basic Sciences for Sustainable Development to highlight the crucial role of basic sciences for sustainable development, and emphasize their contributions to the implementation of the 2030 Agenda and achievement of the Sustainable Development Goals. The proposal for the Year was developed by ISC Member, the International Union of Pure and Applied Physics (IUPAP), with the encouragement and support of the ISC and you, our Members, as well as partner institutions and the UNESCO. Congratulations to the IUPAP on having this International Year endorsed by the United Nations.
Access the press release: *https://council.science/current/press/international-year-of-basic-sciences-proclaimed-un/*.
[From ISC Update on December 10, 2021]

Soil erosion by water (update for 2016)

An update of the 2010 soil erosion indicator took place for the year 2016 with new inputs from Farm Field Survey, LUCAS and CORINE Land Cover. Compared to the assessment for 2010, we estimate a very small decrease of soil loss by water erosion (<1%) due to a limited increase of applied soil conservation practices and land cover change observed at the EU level. The modelling results suggest that, currently, ca. 25% of the EU land has erosion rates higher than the recommended sustainable threshold (2 t ha−1 yr−1) and more than 6% of agricultural lands suffer from severe erosion (11 t ha−1 yr−1). The results are documented with relevant publication.
Access these new data (as a raster file): *https://esdac.jrc.ec.europa.eu/content/soil-erosion-water-rusle2015*.
[From ESDAC Newsletter No 137 (January 2022)]

Update of Cover Management (C-factor) for year 2016

The elaboration of the EU Farm Structure Survey data for 2016 and CORINE Land Cover2012 in the GIS-based LANDUM model allowed to update the knowledge about the most recent changes in land use and arable land management. Using the data on tillage, plant residues and cover crops, we updated the Cover-management (C-factor) in EU for 2016. The increase of land under soil conservation practices and the land cover change have contributed to decreasing the mean C-factor by –0.8%.
Read more: *https://esdac.jrc.ec.europa.eu/content/cover-management-factor-c-factor-eu*.
[From ESDAC Newsletter No 137 (January 2022)]

Soil, a burst of life: the hidden world beneath our feet

The JRC Soil Team developed a new online course on soil biodiversity, available on the EU academy platform. It aims at raising awareness and increasing knowledge of the secret life beneath our feet. It also allows you to familiarise with European Union initiatives for soil (biodiversity) protection. The target audience is science teachers, high school students and the general public.
Read more: *https://academy.europa.eu/courses/soil-a-burst-of-life-the-hidden-world-beneath-our-feet*.
[From ESDAC Newsletter No 137 (January 2022)]

Have we overlooked the importance of soil micronutrients for global grassland biomass production?

Grasslands are one of the largest terrestrial systems, occupying about 40% of the global land surface. Given that they account for up to one-third of the net primary productivity on land, they play an important role in global carbon sequestration as well as in the provision of multiple other ecosystem services to human society, including biodiversity, fodder production and nutrient cycling. Biomass production is a key property of grasslands that determines their capacity to take up and store

carbon, controls which plant species can co-exist and influences the diversity of numerous animals that depend on plants for food and habitat.
Read more: *https://www.globalsoilbiodiversity.org/blog-beneath-our-feet/2022/1/3/have-we-overlooked-the-importance-of-soil-micronutrients-for-global-grassland-biomass-production*.
[From GSBI Newsletter – January 2022]

Communication Campaign: World Soil Day | 5 December 2021

The celebration of World Soil Day 2021 '*Halt soil salinization, boost soil productivity*' received very solid media attention throughout the week, reaching 1.2 billion people around the globe. FAO Director-General's words – on how soil is the foundation of agriculture and how the world's farmers depend on it to produce about 95 per cent of the food we eat – opened up the FAO official celebrations that were attended by over 2 000 people from 182 countries. Ten FAO Regional, Sub-regional, Liaison and Country offices organized official celebrations on 5 December while over 650 worldwide events have so far been registered on the interactive map.
Over 330 million people discussed, debated and advocated the importance of healthy soils for a healthy life on Twitter using the official hashtag of the campaign #WorldSoilDay.
Read more: *https://www.fao.org/world-soil-day/en/*.
[From Global Soil Partnership Newsletter No. 34, 22 December 2021]

Workshop on Global Soil Governance

One of the core mandates of the FAO's GSP is to improve soil governance at all levels, providing support for countries in strengthening normative and regulatory frameworks with an impact on soil management. As such, GSP organized the webinar "Global soil governance: Status and future perspectives" within the framework of the EUROSOIL 2021 conference, which took place on 25th August 2021 in a virtual format. The report and the recordings of the meeting have just been published!
Read more: *https://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1459432/*.
[From Global Soil Partnership Newsletter No. 34, 22 December 2021]

NETSOB – The Global Soil Biodiversity Network

The **International Network on Soil Biodiversity** (NETSOB) was successfully launched and established on the 3 December with over 800 participants. All co-organizers and participants committed to start implementing the recommendations of the *GSOBI21 Outcome document*. Over 670 scientists, researchers, international organizations, institutions, decision makers and farmers with expertise in the assessment, mapping, monitoring and sustainable use of soil biodiversity have enrolled in the network and will start carrying out the scheduled activities from January 2022.
Read more: *https://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1457777/*.
[From Global Soil Partnership Newsletter No. 34, 22 December 2021]

ISC Activity and Achievement Report (2018-2021) published

During the 2nd ISC General Assembly, the ISC President and CEO presented a report of ISC activities and achievements during the first three years of operation of the Council. The report is now published and shows to which extent the ISC and its Members are succeeding in pursuing our mission to advance science as a global public good. Thanks to all our Members for contributing to the ISC's successful first three-year term.
Read more: *https://council.science/publications/activity-achievement-report-2018-2021/*.
[From ISC Update on January 6, 2022]

Recarbonizing global soils – A technical manual of recommended management practices

During the last decades, soil organic carbon (SOC) attracted the attention of a much wider array of specialists beyond agriculture and soil science, as it has proven to be one of the most cost-effective nature-based solutions to reduce and mitigate the effects of climate change. Soils are the largest terrestrial carbon pool and this soil component is one of the key factors in soil health and therefore contributes to achieving several Sustainable Development Goals, in particular Goal 15, "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss", with SOC stocks explicitly cited in Indicator 15.3.1.
Read more: *https://www.fao.org/global-soil-partnership/areas-of-work/soil-organic-carbon-manual/en/*.

The Global Soil Biodiversity Initiative

Seeking to promote expert knowledge on soil biodiversity in environmental policy and sustainable land management to protect and enhance ecosystem services
Read more: *https://www.globalsoilbiodiversity.org/?fbclid=IwAR2GF4hH_Gpx218enMKGlXnVFgBHl65HBEcwEffj1-DHfrVQxOvBMszaKIg*.

Soil, a burst of life: the hidden world beneath our feet

Soil is home to a quarter of the species on our planet. As they live hidden in the soil, these organisms are too often overlooked. Nonetheless, they support us in many ways, from food production and climate regulation to medicine discovery. Therefore, they deserve much more attention than they get.
Soil biodiversity is extremely variegated. It encompasses microorganisms, such as bacteria and fungi, as well as "big" animals like earthworms and moles. In between there is a huge variety of organisms, ranging from nematodes, the most abundant animals on Earth, to the colorful springtails.
This course aims at raising awareness and increasing knowledge of the secret life beneath our feet, taking the public on a fascinating journey of discovery. It also allows you to familiarise with European Union initiatives for soil (biodiversity) protection.
Read more: *https://academy.europa.eu/courses/soil-a-burst-of-life-the-hidden-world-beneath-our-feet?fbclid=IwAR2ACAsWpUe2cozqyBxEd5B8_z78sTP_pQzUvNzKV7BCeY-lex-CgTy6UYY*.

Soil and land use factors control organic carbon status and accumulation in agricultural soils of Lower Austria

Policies for restoring soil health and mitigating climate change require information on soil organic carbon (SOC) stocks and their spatial and temporal variation, and related sequestration potentials. Using the province of Lower Austria as environmentally diverse model region, the authors present a detailed analysis of SOC stocks, saturation potentials and deficits along with SOC monitoring data for the past three decades.
Read more: *https://www.sciencedirect.com/science/article/pii/S0016706121006753*.

Agriculture ministers reach consensus to protect and use soils sustainably

On 28 January 2022, 68 agriculture ministers from around the world attended the *Global Forum for Food and Agriculture (GFFA)* – an international conference that is held each year in Berlin – to discuss agri-food policy issues. The topic of this year was 'Sustainable Land Use: Food Security Starts with the Soil'.
The IUSS had the honour of organising the first expert panel of the Global Forum for Food and Agriculture (GFFA). The panel was entitled 'Global perspectives on sustainable soil management towards food security' and was held on Monday, 24 January 2022, from 5:00 to 6:00 p.m. (CET), with a subsequent deep dive from 6:00 to 6:30 p.m.
The panel was moderated by Dr. Edoardo A.C. Costantini, Senior Researcher, CNR- Institute of Bioeconomy, Florence, Italy and President Elect of the International Union of Soil Sciences.
Read more: *https://www.gffa-berlin.de/en/fachpodien_2022/iuss/#1607953699546-3e4d32c4-96e2*.

Communiqué: Food Security Starts with the Soil

By agreeing to abide by the contents of the communiqué – which is the first of its kind – 68 ministers successfully set ambitious targets and demonstrated dedication to ramp up efforts to stem soil degradation. Some of the key points include:

- Soils must be protected;
- Progress must be made with climate change mitigation and climate adaptation;
- Soil biodiversity is vital for healthy soils. As global land resources are limited, they need to be managed sustainably;
- Fair (rights-based) access to agricultural land should be guaranteed;
- Investment, research, innovation and digitalisation can play a significant role in making the use of soils more sustainable;
- Resilient and sustainable food systems must be supported.

Read the communiqué: *https://www.gffa-berlin.de/wp-content/uploads/2015/10/gffa-2022-kommunique-en.pdf*
FAO press release: *https://www.fao.org/newsroom/detail/agriculture-soils-degradation-FAO-GFFA-2022/en*.
[From Global Soil Partnership Special announcement No. 38, 4 February 2022]

Journal of Plant Nutrition and Soil Science celebrates its 100th anniversary

In 2022 the Journal of Plant Nutrition and Soil Science celebrates its 100th anniversary. Founded in 1922, JPNSS is probably the oldest journal still publishing in this field worldwide. It is one of the cooperating journals of IUSS. On the occasion of the journal's Centenary Year 2022, a selected number of invited papers authored by recognized scientists in their fields has been published open access (see *https://onlinelibrary.wiley.com/toc/15222624/2022/185/1*).

Among the invited papers, there is a viewpoint of Edoardo A.C. Costantini (president elect of the IUSS) and Stefano Mocali (vice-chair Centennial of Division 2) about soil health, soil genetic horizons and biodiversity.

The article emphasizes the importance of a holistic approach to the evaluation and monitoring of soil health, which considers both the functional biodiversity of the soil and the nature of the genetic horizons of the entire profile. Although biological activity is often concentrated in the surface horizon, there is ample evidence that deep soil horizons host relevant biological communities, governed by soil conditions usually different from those found in topsoil. The processes responsible for the formation of the genetic horizons of the soil produce characteristics that select the presence of organisms. The authors conclude that the loss of the natural self-organization of genetic horizons is therefore a form of degradation of soil health.

Reference: Edoardo A.C. Costantini, Stefano Mocali (2022). Soil health, soil genetic horizons and biodiversity. J. Plant Nutr. Soil Sci.2022; 185:24–34. *https://doi.org/10.1002/jpln.202100437*.

Update on the FEBR Soil Data Repository

A new version of the FEBR (Free Brazilian Repository for Open Soil Data) package for R environment is available the Comprehensive R Archive Network (CRAN) <*https://cran.r-project.org/web/packages/febr/index.html*>. The package makes access to the Free Brazilian Repository for Open Soil Data (FEBR) <*https://www.pedometria.org/febr*> as easy as possible. You can also access the package via Github and check all the new features and bug fixes of the latest release version in the NEWS file <*https://github.com/Laboratorio-de-Pedometria/febr-package/blob/master/NEWS.md*>.

Developing a high-resolution land use/land cover map by upgrading CORINE's agricultural components using detailed national and pan-European datasets

The agricultural uses of the Coordination of Information on the Environment Land Cover (CLC) dataset suffer from limitations such as temporal stationarity, low spatial resolution, broad and rather simplified grouping of classes. The study attempts to address these shortcomings, using as test site the Sperchios River catchment, Central Greece. The Greek 'branch' of the Land Parcel Identification System, Beneficiaries' Declarations (BD) and CLC inventories were utilized to develop hybrid layers, deriving from their harmonization, sequential incorporation and progressive update (BD → BD-ilot → BD-ilot-CLC). The final layer constitutes the new object-oriented Land Use/Land Cover map. Remote sensing data (Sentinel-2) was used to validate the accuracy of the BD, subject to the most frequent errors. The new map retains the key advantages of CLC yet is now characterized by highly detailed spatial resolution and the explicit description of the different cultivated farmlands included.

Read more: *https://www.tandfonline.com/doi/full/10.1080/10106049.2022.2041107?fbclid=IwAR0UU2_018CbugBpt5VYngFVPhYCqTuLTO02GbpDIs9X9zFnbn3E7C6k7K4*.

Global soil organic carbon stocks in natural and urban ecosystems

Despite efforts to mitigate climate change, it still remains challenging for humans to reduce carbon emissions and meet carbon neutrality under the pressure of increasing global population and urbanization. In terrestrial environments, soil is the largest organic carbon sink and offers the greatest opportunity to mitigate the global carbon imbalance. Soil organic carbon (SOC) stocks originate from detritus and root exudates.

In this study, a meta-analysis was conducted by collecting SOC data from published literature. Each study location was defined as a natural, urban green space, or urban intensive habitat and compared those carbon stocks within defined climatic zones, vegetation types, and the Human Footprint (a unitless metric reflecting the extent of human disturbance) in each study location.

Read more: *https://www.globalsoilbiodiversity.org/blog-beneath-our-feet/2022/1/13/global-soil-organic-carbon-stocks-in-natural-and-urban-ecosystems*.

[From GSBI Newsletter – February 2022]

New EU Online Soil Biodiversity Course

The JRC Soil Team developed a new online course on soil biodiversity, available on the EU academy platform: *Soil, a burst of life: the hidden world beneath our feet*. It aims at raising awareness and increasing knowledge of the secret life beneath our feet. It also allows you to familiarise with European Union initiatives for soil (biodiversity) protection. The target audience is science teachers, high school students and the general public.

Read more: *https://academy.europa.eu/courses/soil-a-burst-of-life-the-hidden-world-beneath-our-feet*.

[From GSBI Newsletter – February 2022]

Phosphorus plant removal

In a recent publication, we estimated the Phosphorus (P) removal from agricultural lands of EU and UK (ca. 173 million ha). This takes into account the P removed by crop harvesting and the plant residues. For P removed by crop harvesting, we used 7 major categories of crops and 37 crops in more than 220 regions of EU and UK. The total P removal was about 2.55 million tonnes (Mt) (± 0.23 Mt), with crop harvesting having the larger contribution (ca. 94%) compared to the crop residues removal. The mean P removal by crop harvesting is 14 kg ha-1 yr-1. Data are available.

Read more: *https://esdac.jrc.ec.europa.eu/themes/phosphorus-budget-topsoils*.

[From ESDAC Newsletter 138 (February 2022)]

Rainstorms erosivity indexes

Heavy rainstorms play a central role in the water soil erosion processes. In a recent publication, we provide the spatiotemporal distribution of more than 300,000 erosive events measured at 1181 locations as part of the Rainfall Erosivity Database at European Scale (REDES) database. Rainfall erosive events are statistically investigated through the Lorenz curve and derived coefficients such as the Gini coefficient (G). In Europe, on average 11% of all erosive events contribute to 50% of the total rainfall erosivity. Data ("Rainstorm erosivity indexes") are available with all erosivity datasets

Read more: *https://esdac.jrc.ec.europa.eu/content/rainfall-erosivity-european-union-and-switzerland*.

[From ESDAC Newsletter No 138 (February 2022)]

What, where and how do soil animals eat? And why do we need to know?

We all know the early bird catches the worm, but what does the worm catch? What animals that live in soil eat down there is hard to observe but important to know. Studies on what exactly different soil animals feed on, how they are connected by these feeding (trophic) interactions, and how these interactions in turn support the many functions that we expect soils to deliver, have now been compiled and summarized by an international team of experts in a comprehensive review published in the journal *Biological Reviews*.

Read more: *https://www.globalsoilbiodiversity.org/blog-beneath-our-feet/2022/3/2/what-where-and-how-do-soil-animals-eat-and-why-do-we-need-to-know*.

[From GSBI Newsletter – March 2022]

New synthesis on achieving global biodiversity goals

GEO BON and bioDISCOVERY produced a synthesis called *"Transformative actions on all drivers of biodiversity loss are urgently required to achieve the global goals by 2050."*

The Convention on Biological Diversity created the following list of takeaways:

1. Action targets are linked to multiple milestones and goals.
2. Transformative change is essential.
3. All five main direct drivers of biodiversity loss have substantial impacts on biodiversity.
4. Act across levels.
5. Include managed ecosystems.
6. Act on all dimensions of biodiversity.
7. Immediate and sustained action to ensure recovery.
8. Coordinate actions across scales.
9. Invest in monitoring.

Read more: *https://geobon.org/geo-bon-provides-an-updated-synthesis-for-the-post-2020-global-biodiversity-framework/*.

[From GSBI Newsletter – March 2022]

Online Resources

IFORS offers a Developing Countries Online Resources page for operational research (OR) workers of all publicly available materials on the topic of OR for development. With this open resources page, IFORS aims to make research and application results better accessible to the many friends in the Developing Countries (DCs). Researchers who are working in the area can share their

completed or in-process work, learn from others, and stimulate comments and discussions on the work. Contributions from art and science, communication and education sectors are warmly welcome by our community, which has very little access to emerging documents on arts and sciences, research, design and development.
Read more: *http://ifors.org/developing_countries/index.php?title=Main_Page*.
[From GSBI Newsletter – March 2022]

Glucose-induced priming effects in soils across Europe

This new ESDAC dataset includes a quantification and comparison of glucose-induced priming effects in soils with contrasting land uses and under different crop types. On average, priming effects (PEs) were negative in semi-natural and cropland soils, meaning that microbial communities preferentially switched from soil organic C (SOC) decomposition to glucose mineralization. The data were obtained from samples of LUCAS 2018. In the publication, it was concluded that PEs were driven by soil basal respiration, microbial biomass C, and SOC. Data available.
Read more: *https://esdac.jrc.ec.europa.eu/content/priming-effects-soils-across-europe*.
[From ESDAC Newsletter 139 (March 2022)]

Gully Erosion based on LUCAS

We integrated a soil erosion module in LUCAS 2018 Topsoils survey for the EU and UK. The 2018 LUCAS Topsoil Survey consisted of soil sampling (0–20 cm depth) and erosion observations conducted in 24,759 field survey sites. Gully erosion channels were detected for ca. 1% (211 sites) of the visited sites. The results presented in the publication indicate that LUCAS visual assessment is effective to map permanent gullies, whereas it appears less effective to detect short-lived forms like ephemeral gullies. The dataset includes the points with gully erosion channels and selected pictures.
Read more: *https://esdac.jrc.ec.europa.eu/content/gully-erosion-based-lucas*.
[From ESDAC Newsletter 139 (March 2022)]

GLOSOLAN and the Proficiency Testing Exercise

GLOSOLAN is conducting Proficiency Testing (PT) throughout 2022. This exercise is crucial for soil analysis and data harmonization. Soil samples are shipped to national referenced labs and results are uploaded directly through a dedicated online platform. GLOSOLAN has also donated equipment to those labs that lack such tools.
Read more: *https://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1476332/*.
[From Global Soil Partnership Newsletter No. 35, March 2022]

Soil Biodiversity for Kids in Kyrgyz

The **Magical World of Soil Biodiversity** is the collection of the best ten stories for children produced by soil scientists, universities and designers from all around the world in the framework of the WSD 2020 children contest on soil biodiversity. After Russian, a new language version (Kyrgyz) has just been released.
Read more (in Kyrgiz):
https://www.fao.org/publications/card/en/c/CB4185KY.
Russian version:
https://www.fao.org/publications/card/en/c/CB4185RU.
English version:
https://www.fao.org/publications/card/en/c/CB4185EN.
[From Global Soil Partnership Newsletter No. 35, March 2022]

GSOCseq brochure

The GSOCseq (Global Soil Organic Carbon Sequestration) Potential Map allows users to prioritize areas where SSM can be adopted to enhance SOC stocks and improve soil health. The map helps identify the regions, soil types and farming systems with greater potential to increase SOC stocks in order to scale up the fight against climate change.
Read more: *https://www.fao.org/3/cb8913en/cb8913en.pdf*.
[From Global Soil Partnership Newsletter No. 35, March 2022]

The International Federation of Operational Research Societies (IFORS) Developing Countries News from the International Science Council (ISC)

ISC joins Scholars at Risk (SAR)

We are delighted to announce our membership of Scholars at Risk (SAR), a network of over 520 higher education institutions in 43 countries working to protect threatened scholars, prevent attacks on higher education and promote academic freedom. Our membership will serve to strengthen the protection and promotion of scientific freedom and responsibility, in accordance with the ISC's Statute (II.), Article 7 on "The Principle of Freedom and Responsibility in Science" (*https://council.science/publications/statutes-and-rules-of-procedure/*).

By formally joining the SAR network, the ISC can now increase its participation in SAR's activities and create new opportunities for collaboration with like-minded organizations around the world. More details of these collaborations will be announced in due course. In the meantime, ISC Members are warmly invited to learn more about Scholars at Risk and how to get involved – please contact CFRS Executive Secretary Vivi Stavrou (*vivi.stavrou@council.science*) or sign up for SAR updates via *http://salsa4.salsalabs.com/o/50943/p/salsa/web/common/public/signup?signup_page_KEY=9978*.

ISC Member, the International Foundation for Science celebrating 50 years

In 2022, the IFS (*http://www.ifs.se/*) reaches a half-century of supporting the research of more than 8000 early career scientists in Africa, Asia, and Latin America and the Caribbean. The theme of their anniversary is "Supporting Early Career Scientists in the Global South for 50 Years and Counting". The IFS50 celebration is not only about honouring their past but also innovating for the future. Join the IFS in celebrating their 50th anniversary and let them know your views on how can they can have the most impact (please e-mail *bahati.orlendo@ifs.se*).
[From ISC Update on March 7, 2022]

The Global Soil Organic Carbon Sequestration Potential Map (GSOCseq) has been launched!

These maps allow for the estimation of topsoil (0-30 cm) soil organic carbon sequestration potential in agricultural areas under four soil management scenarios: a Business as Usual (BAU) scenario and three Sustainable Soil Management (SSM1, SSM2 and SSM3) scenarios.
The untapped potential of sequestering Soil Organic Carbon (SOC) in agriculturally managed soils as one of the most cost-effective nature-based solutions for climate change mitigation and adaptation has been widely described in recent years. However, unlocking this potential relies on the establishment of strong mechanisms to monitor, report and verify (MRV) changes in SOC stocks.
Read more: *https://www.fao.org/3/cb8913en/cb8913en.pdf?fbclid=IwAR2-1l5UXgblctatGExBklcHcmZR1eNoe6P54cIe5r1dHXEih37l3ZJoWCw*.

Call for Papers on Decision Support Systems for Sustainable Use of Land

The demands on our landscapes are increasingly in conflict with each other (e.g. transition to sustainable agriculture versus expansion of urban areas, increasing food production versus demands for biodiversity enhancement and greenhouse gas sequestration, etc.). In addition, we are confronted with increasing number of problems related to soil degradation (erosion, loss of soil fertility and biodiversity, soil compaction, floods, water pollution, etc.). It has been shown that making decisions to meet these needs and solve the problems is extremely complex and difficult task. Similar problems are also evident in the implementation of multiscale land policies at global (e.g. SDGs), European (e.g. CAP), national (e.g. climate change adaptation plans in EU Member States), regional (e.g. implementation of the EU Nitrates Directive) and local (e.g. urban planning) levels. This special issue aims to collect research papers on advanced approaches and methods in land-based geoSpatial Decision Support Systems (S-DSS). The special issue also aims to address the question of whether S-DSS systems have the potential to address the complexity of the above-mentioned problems and make the transition to sustainable use of land and soils.
Read more: *https://onlinelibrary.wiley.com/journal/1099145x/decision-support-system-sustainable-use*.

ESDAC datasets

The European Soil Data Centre (ESDAC) offers access to many, mostly EU-wide datasets. These include the European Soil Database, data on soil threats (soil erosion, soil organic carbon, landslides, soil biodiversity, diffuse contamination, etc.), LUCAS point data and derived products, soil functions. All datasets are free to download. ESDAC is an integral part of the European Soil Observatory.
Read more:
https://esdac.jrc.ec.europa.eu/resource-type/datasets.
[From ESDAC Newsletter 140 (April 2022)]

Soil Biodiversity Conservation literature and legally binding instruments

This meta database includes a review of 54 articles addressing soil biodiversity conservation at the EU or Member States level. In addition, we present Member States policy documents which address Soil Biodiversity Conservation. These can be either strategies for soil protection at the Member State level or legally binding instruments (binding/hard law) implicitly and explicitly

addressing threats to soil biodiversity. More information can be found in the published study.
Access the meta database: *https://esdac.jrc.ec.europa.eu/content/soil-biodiversity-conservation-literature-and-legally-binding-instruments*.
[From ESDAC Newsletter 140 (April 2022)]

World Ranking of Agricultural scientists

This 1st edition of top scientists ranking for Plant Science and Agronomy was published by Research.com, one of the major websites for Plant Science and Agronomy research offering credible data on scientific contributions since 2014. Some soil scientists are included in the ranking, with Rattan Lal, former IUSS president, occupying the 2nd rank in plant science and agronomy.
Read more: *https://research.com/scientists-rankings/plant-science-and-agronomy*.

Are legumes more than the sum of their nodules?

Marie Schaedel, University of Minnesota, USA, discusses her new paper in Frontiers in Sustainable Food Systems. The authors reviewed articles published within the past fifteen years that investigated legume-microbe interactions, with a specific focus on associations with non-rhizobia bacteria. The authors found strong evidence suggesting that legume root zones enhance microbial abundance and diversity compared to non-legume plants such as grasses.
Read more: *https://www.globalsoilbiodiversity.org/blog-beneath-our-feet/2022/4/5/are-legumes-more-than-the-sum-of-their-nodules*.
[From GSBI Newsletter – April 2022]

News from the International Science Council (ISC)

Talk Back Better Webinar Series Launching in May
As part of the ISC's Public Value of Science programme and in partnership with the Falling Walls International Year of Science Engagement initiative we are convening a series of webinars exploring a discursive analysis on science communication practice, along with practical tips for researchers and research managers. The series will run every week for 5 weeks starting Thursday 26 May. ISC Members are invited to register at the following link: *https://council.science/current/news/talk-back-better-webinar-series-starting-may/*.

Call for papers on open science policies as an accelerator for achieving the Sustainable Development Goals
UNESCO, in collaboration with the Journal of Science Policy & Governance (JSPG) and the Major Group for Children and Youth (MGCY) launch a special issue on Open Science Policies as an Accelerator for Achieving the Sustainable Development Goals.
Deadline for submission: 10 July 2022
Read more: *https://www.unesco.org/en/articles/call-papers-open-science-policies-accelerator-achieving-sustainable-development-goals*.

UNESCO launches a global call for best practices in open science
Further to the adoption of the UNESCO Recommendation on Open Science in November 2021, UNESCO is launching a Global Call for Best Practices in Open Science. The resulting compendium of best practices will be a useful tool to better understand the current landscape of open science, share lessons learned, identify and connect open science actors around the world, and further develop innovative solutions for open science in a collaborative, inclusive and transparent manner. Inputs can be provided in English, French or Spanish.
Deadline: 15 July 2022
Read more: *https://www.unesco.org/en/articles/unesco-launches-global-call-best-practices-open-science*.
[From ISC Update on May 9, 2022]

Call for papers for special issue in Geoderma Regional on transitioning to healthy soils with agroforestry systems

A healthy soil is a living ecosystem that sustains biological productivity while maintaining the quality of the abiotic environment and protecting soil microbial, plant and animal life. Trees play a fundamental role in sustaining soil health, and they also contribute to the regeneration of degraded land. Agroforestry systems, where trees are deliberately combined with agriculture, are a sustainable land management practice that improves soil health by enhancing soil organic carbon storage, nutrient availability, and promoting soil microbial community diversity. Agroforestry systems also facilitate the transition to regenerative and sustainable land-use practices. However, to what extent can agroforestry systems fulfill this role? What conditions are needed for agroforestry systems to maximize soil health and productivity? These questions remain unresolved and require further research. This special issue will report on the most recent studies conducted in tropical, temperate, and Mediterranean climates that demonstrate how agroforestry systems are responsible for soil improvements as we transition to healthy soils.
Anticipated submission deadline: December 31, 2022
Read more: *https://www.sciencedirect.com/journal/geoderma-regional/about/call-for-papers*.

Does large-scale turnover in soil biodiversity mirror what we see aboveground?

Plants are foundational primary producers and form the great majority of biomass in terrestrial ecosystems. So, it is not unreasonable that we use vegetation characteristics, along with macro-climatic correlates and a dose of expert opinion, to classify large-scale variation in biodiversity (i.e. biomes). In his paper, John Davison, Institute of Ecology and Earth Sciences, University of Tartu, Estonia, discusses a study which found that variation in most organism groups – including bacteria, archaea and different fungal guilds – was best explained by the combination of air temperature and soil pH; with eukaryotic groups responding more to temperature and prokaryotic groups more to pH.
Read more: *https://www.globalsoilbiodiversity.org/blog-beneath-our-feet/2022/5/1/does-large-scale-turnover-in-soil-biodiversity-mirror-what-we-see-aboveground*.
[From GSBI Newsletter – May 2022]

Giant World-Wide Assessment of Macroinvertebrate Communities published

Patrick Lavelle and colleagues recently published their world-wide assessment of soil macroarthropods in the journal **Global Ecology and Biogeography**.
Macroinvertebrates comprise a highly diverse set of taxa with great potential as indicators of soil quality. Communities were sampled at 3,694 sites distributed world-wide. The authors aimed to analyse the patterns of abundance, composition and network characteristics and their relationships to latitude, mean annual temperature and rainfall, land cover, soil texture and agricultural practices.
Main conclusions: Soil macroinvertebrate communities respond to climatic, soil and land-cover conditions. All taxa, except termites, are found everywhere, and communities from the five clusters cover a wide range of geographical and environmental conditions. Agricultural practices significantly decrease abundance, although the presence of tree components alleviates this effect.
Read more:
https://onlinelibrary.wiley.com/doi/full/10.1111/geb.13492.
[From GSBI Newsletter – May 2022]

Global rainfall erosivity projections for 2050 and 2070

We present a comprehensive set of future erosivity projections at a 30 arc-second (~1 km^2) spatial scale using 19 downscaled General Circulation Models (GCMs) simulating three Representative Concentration Pathways (RCPs) for the periods 2041–2060 and 2061–2080. The future rainfall erosivity projections were obtained based on a Gaussian Process Regression (GPR) approach relating rainfall depth to rainfall erosivity through a series of (bio)climatic covariates. In the new study, we estimate a potential average increase in global rainfall erosivity between 26.2 and 28.8% for 2050 and 27–34.3% for 2070 compared to 2010 baseline. The results of 102 simulations and 6 aggregated datasets are available.
Read more: *https://esdac.jrc.ec.europa.eu/content/global-rainfall-erosivity-projections-2050-and-2070*.
[From ESDAC Newsletter 141 (May 2022)]

Award for "Healthy Soils for Healthy Vines. Soil Management for Productive Vineyards."

The International Jury of the OIV, the International Organisation of Vine and Wine, has awarded the book "Healthy Soils for Healthy Vines. Soil Management for Productive Vineyards" the PRIX de l'OIV 2021, OIV AWARD 2021, in the category Vitiviniculture Durable – Sustainable Vitiviniculture. The IUSS congratulates the authors Robert White and Mark Krstic on winning this award.
Read more: *https://www.oiv.int*.

Upcoming Conferences & Meetings

2022

22nd World Congress of Soil Science 2022

Sunday, 31. July 2022 to Friday, 5. August 2022
Glasgow, United Kingdom
Congress website: *https://22wcss.org/*.

ESAFS2022: 15th international conference of the East and Southeast Asia Federation of Soil science societies (ESAFS) – "Our Soils Our Future"

22 August 2022 to 26 August 2022
Royale Chulan Hotel, Kuala Lumpur, Malaysia
ESAFS conference is a series of scientific meeting organized every two years to share invaluable experience and knowledge among soil scientists particularly within East and Southeast Asia countries. It is also a platform to promote R&D and disseminate the acquired knowledge and technology related to soil sciences. This series of ESAFS's conference are organized to fulfill part of the above aims, rotates within member countries thus allowing equal participations of local soil scientists and fair site information exchange. ESAFS 2022 is the second time for Malaysia as an organizer.
Read more: *https://www.msss.com.my/esafs2022/*.

4th International Conference on Hydropedology

August 23–26, 2022
Skukuza, South Africa
Deadline for abstract submission: March 1, 2022
Website: *https://www.ufs.ac.za/conferences/conference/fourth-international-conference-on-hydropedology*.

ISCRAES 2022: The 2nd International Symposium on Climate-Resilient Agri-Environmental Systems

Sunday, 28 August 2022 to Wednesday, 31 August 2022
Dublin, Ireland
Deadline of abstract submission: 17 June 2022
Read more: *www.iscraes.org*
Download flyer: *https://www.iuss.org/media/iscraes_2022_flyer_23-03-22.png*.

16th International Conference on Soil Micromorphology (ICoSM), Kraków, 2022

September 4-8, 2022, Kraków, Poland. Venue: Jagiellonian University.
Registration and abstract submission now open.
Read more: *http://www.icosm2020.sggw.pl/*.
Download the circular *http://www.icosm2020.sggw.pl/wp-content/uploads/2021/11/1st_Circular_ICoSM_2022_Krakow.pdf*.
The optional micromorphological course is to take place on August 29 – September 3, 2022. All necessary information is available at *http://www.icosm2020.sggw.pl/course/*.
The optional post-conference trip will take place from September 9th to 11th, 2022. The detailed information about the trip is available at *http://www.icosm2020.sggw.pl/trips/*.
We offer three ICoSM 2022 Young Micromorphologist Awards, which are supported by the IUSS Stimulus Fund. Details at *http://www.icosm2020.sggw.pl/scholarships/*.

11th international conference of the IUSS Working Group on Soils of Urban, Industrial, Traffic, Mining and Military Areas (WG SUITMA)

'Soils in the food-water-energy-nexus'
5-9 September 2022, Berlin, Germany.
SUITMA 11 website: *https://suitma11.org/*.

Soil Classification and Education Conference

12-14 September 2022, Toruń, Poland
Globalization and global environmental issues, as well as unification of scientific research and teaching on the European Union and global levels require harmonization of technical languages, such as the terminology used in soil science. An important part of our technical language is soil description and classification. The long-term development of the unified system – World Reference Base for Soil Resources (WRB), is an important challenge for teaching of soil science related subjects in Europe and the World. National/local focus in soil sciences teaching still dominates which complicates exchange of information, students and professionals. The aim of this conference is to present solutions for **international education in soil science**, elaborated within the Erasmus+ SYStem project, to discuss the new attempts at soil description and classification and to share ideas on how to educate Youth and Adults for the benefit of society and environment. Another aim is to raise awareness of global pedosphere-related threats like soil depletion, erosion, salinization and desertification. Participants' experiences and thoughts related to soil science teaching would be a frame for both indoor and outdoor discussions.
Conference website:
https://sites.google.com/view/soil-classification/home.

LuWQ2022 – 5th International Interdisciplinary Conference on LAND USE AND WATER QUALITY: Agriculture and the Environment

12-15 September 2022, Maastricht, The Netherlands
A conference on the cutting edge of science, management and policy to minimise effects of agriculture and land use changes on the quality of groundwater and surface waters. Target groups (professionals, fields of expertise, audience) are scientists, managers and policy makers involved in the policy cycle for water quality improvement.
The key strength of the conference is twofold. On the one side, Land Use and Water Quality conferences have a well-defined narrow focus on 'agriculture and water quality'. On the other side, the conferences are broadly oriented with regard to the various professional disciplines related to the conference topics. It is just the diversity in professional background of participants which results in a multi-faceted conference programme.
Download conference flyer:
https://www.luwq2022.nl/wp-content/uploads/2021/05/LuWQ2022_Flyer_A4page_4pages_17-05-2021.pdf.
Conference website: *https://www.luwq2022.nl/*.

Intersol 2022 – What Strategy for European Soils in 2030?

5-6 October 2022
Brussels, Belgium
Europe is ringing the end of recreation in terms of soil management: A great start for an ambitious, integrated and sustainable strategy! The six main topics of this event will be: Soil & Climate, Soils and Circular Economy, Zero soil artificialization, Soils and Biodiversity, What practices for sustainable soil management? and Soils and digital management.
Call for papers deadline: April 29, 2022
Conference website: *https://www.webs-event.com/en/event/intersoil/appelacom/*.

ISPRS Workshop Geo-Informatics Supported Disaster Risk Reduction and Smarter Urban Management

November 1-4, 2022
Beijing, China
The event is an annual conference devoted to the application of geoinformatics in disaster risk reduction since 2005, organized by ISPRS in cooperation with different international bodies such as UNOOSA, ICA, ISCRAM FIG, IAG OGC, and WFP. The fundamental goal of the conference is to provide a forum where disaster managers, stakeholders, researchers, data providers and system developers can discuss challenges, share experience, discuss new ideas, demonstrate technology and analyze future
Abstract submission (published in Archives): July 15, 2022
Full paper submission (published in Annals): July 15, 2022
Workshop website: *https://www.gi4dm.net/2022/*.
Flyer: *https://www.iuss.org/media/gi4dm_urban_geoinformatics_2022-flyer-v2.pdf*.
Flyer of the ISC GeoUnions Standing Committee on Disaster Risk Reduction
https://www.iuss.org/media/sc-drr_leaflet_v3_digital.pdf.

SSSA Annual Meeting with ASA & CSSA

'Communication and public engagement for healthy people and a healthy planet'
Nov. 6-9, 2022
Baltimore, USA
The American Society of Agronomy, the Crop Science Society of America, and the Soil Science Society of America host a premier international scientific Annual Meeting, Nov. 6-9, 2022 in Baltimore, MD that brings together an international audience from industry, government, and academic institutions including undergrads, grad students, and post-docs who are all working to advance agronomic, crop and soil sciences.
The in-person option of the Annual Meeting provides networking opportunities, innovative scientific oral and posters, technical workshops, and more! A limited virtual option is available, including internationally contributed oral and poster virtual presentations.
Read more: *www.acsmeetings.org*.

2023

Third Global Soil Biodiversity Conference

13-15 March 2023
Dublin, Ireland
Conference website: *https://gsb2021.ie/*.

For the complete list of upcoming events, please see the event calendar on the IUSS website:
https://www.iuss.org/meetings-events/

New Publications

A Visual Atlas for Soil Micromorphologists

By Eric P. Verrecchia, Luca Trombino. Springer, 2021. 177 pages, 1 b/w illustration, 81 illustrations in colour. Hardcover ISBN 978-3-030-67805-0, softcover ISBN 978-3-030-67808-1, eBook ISBN 978-3-030-67806-7, DOI *https://doi.org/10.1007/978-3-030-67806-7*; price hardcover EUR 54.99, price softcover EUR 43.99.

This open access atlas is an up-to-date visual resource on the features and structures observed in soil thin sections, i.e. soil micromorphology. The book addresses the growing interest in soil micromorphology in the fields of soil science, earth science, archaeology and forensic science, and serves as a reference tool for researchers and students for fast learning and intuitive feature and structure recognition. The book is divided into six parts and contains hundreds of images and photomicrographs. Part one is devoted to the way to sample properly soils, the method of preparation of thin sections, the main tool of soil micromorphology (the microscope), and the approach of soil micromorphology as a scientific method. Part two focuses on the organisation of soil fragments and presents the concept of fabric. Part three addresses the basic components, e.g. rocks, minerals, organic compounds and anthropogenic features. Part four lists all the various types of pedogenic features observed in a soil, i.e. the imprint of pedogenesis. Part five gives interpretations of features associated with the main processes at work in soils and paleosols. Part six presents a view of what the future of soil micromorphology could be. Finally, the last part consists of the index and annexes, including the list of mineral formulas. This atlas will be of interest to researchers, academics, and students, who will find it a convenient tool for the self-teaching of soil micromorphology by using comparative photographs.

Read more:
https://www.springer.com/gp/book/9783030678050.

Soil Organic Matter and Feeding the Future – Environmental and Agronomic Impacts

Edited by Rattan Lal. 1st edition published December 9, 2021 by CRC Press, series Advances in Soil Science. 428 pages, 32 color & 58 B/W illustrations.
Hard cover ISBN 9780367609702; price GBP 120.00.

Soil organic matter (SOM) is the primary determinant of soil functionality. Soil organic carbon (SOC) accounts for 50% of the SOM content, accompanied by nitrogen, phosphorus, and a range of macro and micro elements. As a dynamic component, SOM is a source of numerous ecosystem services critical to human well-being and nature conservancy. Important among these goods and services generated by SOM include moderation of climate as a source or sink of atmospheric CO2 and other greenhouse gases, storage and purification of water, a source of energy and habitat for biota (macro, meso, and microorganisms), a medium for plant growth, cycling of elements (N, P, S, etc.), and generation of net primary productivity (NPP). The quality and quantity of NPP has direct impacts on the food and nutritional security of the growing and increasingly affluent human population. Soils of agroecosystems are depleted of their SOC reserves in comparison with those of natural ecosystems. The magnitude of depletion depends on land use and the type and severity of degradation. Soils prone to accelerated erosion can be strongly depleted of their SOC reserves, especially those in the surface layer. Therefore, conservation through restorative land use and adoption of recommended management practices to create a positive soil-ecosystem carbon budget can increase carbon stock and soil health.

Read more: *https://www.routledge.com/Soil-Organic-Matter-and-Feeding-the-Future-Environmental-and-Agronomic/Lal/p/book/9780367609702#*.

Interfacial Chemistry of Rocks and Soils

By Noémi M. Nagy, József Kónya. 2nd edition published October 28, 2021 by CRC Press. 272 pages, 14 color & 45 B/W illustrations. Hard cover ISBN 9780367856823, price GBP 96.00.

Knowledge of the basic interactions that take place between geological materials and different substances is the first step in understanding the effects of adsorption and other interfacial processes on the quality of rocks and soils, and on driving these processes towards a beneficial or neutral result. Interfacial Chemistry of Rocks and Soils examines the different processes at solid and liquid interfaces of soil and rock, presenting a complete analysis that emphasizes the importance of chemical species on these interactions. Furthermore it examines the role of these processes in environmental, colloid and geochemistry; and explores the effects on agricultural, environmental and industrial applications.

This Second Edition features novel results in the field and expanded coverage of the kinetics of interfacial processes. New content includes models of heterogeneous isotope exchange, sorption isotherms for heterovalent cation exchange, as well as sorption of anions by chemically modified clays.

Read more: *https://www.routledge.com/Interfacial-Chemistry-of-Rocks-and-Soils/Nagy-Konya/p/book/9780367856823*.

Advances in Conservation Agriculture. Volume 3 – Adoption and Spread

Burleigh Dodds Science Publishing are delighted to share news of their forthcoming title, *Advances in Conservation Agriculture – Volume 3: Adoption and Spread*, edited by Professor Amir Kassam, University of Reading, UK and Moderator, Global Conservation Agriculture Community of Practice (CA-CoP), FAO, Rome, Italy. 400 pages, Print ISBN: 978-1-78676-475-1, eBook ISBN: 978-1-78676-478-2, Price £150/$195/€180.

The book provides an authoritative review from an array of international experts on the adoption of CA principles in different regions around the world.

The final volume in this collection reviews the effectiveness of CA in differing contexts (e.g. in drier conditions where water conservation is important or in areas with poor soil) and refers to the wealth of research and experiential evidence currently available.

Read more: *https://shop.bdspublishing.com/store/bds/detail/workgroup/3-190-106341*.

Conservation Agriculture in Africa – Climate Smart Agricultural Development

Edited by Saidi Mkomwa and Amir Kassam, January 2022, Hardback, 536 Pages, 9781789245745; ePDF 9781789245752, ePub 9781789245769, price hardback £175.00/€210.00/$245.00.

Tillage agriculture has led to widespread soil and ecosystem degradation globally, and more particularly in the developing regions. This is especially so in Africa where traditional agricultural practices have become unsustainable due to severe exploitation of natural resources with negative impacts on the environment and food system. Conservation Agriculture has emerged as a major alternative sustainable climate smart agriculture approach in Africa and has spread to many African countries in the past decade as more development and research, including in sustainable mechanization, has enabled its extension and uptake. It is key to transforming Africa's agriculture and food system given its ability to restore soil health, biodiversity and productivity of millions of smallholder farms as well as larger-scale farms.

This landmark volume is based on the material presented at the Second Africa Congress on Conservation Agriculture, which was held in Johannesburg, South Africa, 9-12 October 2018. The main theme of the Congress was 'Making Climate Smart Agriculture Real in Africa with Conservation Agriculture: Supporting the Malabo Declaration and Agenda 2063'.

This book is aimed at all agricultural stakeholders in the public, private and civil sectors in Africa engaged in supporting the transformation of conventional tillage agriculture to Conservation Agriculture.

Read more: *https://www.cabi.org/bookshop/book/9781789245745/*.

The State of the World's Land and Water Resources for Food and Agriculture – Systems at breaking point (SOLAW 2021)

Synthesis Report 2021

Published by FAO in Rome, Italy in 2021, 82 pages, ISBN: 978-92-5-135327-1.

Satisfying the changing food habits and increased demand for food intensifies pressure on the world's water, land and soil resources. However, agriculture bears great promise to alleviate these pressures and provide multiple opportunities to contribute to global goals. Sustainable agricultural practices lead to water saving, soil conservation, sustainable land management, conservation of natural resources, ecosystem and climate change benefits. Accomplishing this requires accurate information and a major change in how we manage these resources. It also requires complementing efforts from outside the natural resources management domain to maximize synergies and manage trade-offs.

The objective of SOLAW 2021 is to build awareness of the status of land and water resources, highlighting the risks, and informing on related opportunities and challenges, also underlining the essential contribution of appropriate policies, institutions and investments. Recent assessments, projections and scenarios from the international community show the continued and increasing depletion of land and water resources, loss of biodiversity, associated degradation and pollution, and scarcity in the primary natural resources.

Download link: *https://www.fao.org/3/cb7654en/cb7654en.pdf*.

Read more: *https://www.fao.org/documents/card/en/c/cb7654en*.

Data Science in Agriculture and Natural Resource Management

Edited by G. P. Obi ReddyMehul S. RavalJ. Adinarayana-Sanjay Chaudhary. Published as part of the *Studies in Big Data* book series (SBD, volume 96) by Springer in 2022, XVIII, 316 pages, 13 b/w illustrations, 93 illustrations in colour, Hardcover ISBN 978-981-16-5846-4, Softcover ISBN 978-981-16-5849-5, eBook ISBN 978-981-16-5847-1, price hardcover EUR 164.99, eBook EUR 117.69.

This book aims to address emerging challenges in the field of agriculture and natural resource management using the principles and applications of data science (DS). The book is organized in three sections, and it has fourteen chapters dealing with specialized areas. The chapters are written by experts sharing their experiences very lucidly through case studies, suitable illustrations and tables.

The contents have been designed to fulfil the needs of geospatial, data science, agricultural, natural resources and environmental sciences of traditional universities, agricultural universities, technological universities, research institutes and academic colleges worldwide.

It will help the planners, policymakers and extension scientists in planning and sustainable management of agriculture and natural resources. The authors believe that with its uniqueness the book is one of the important efforts in the contemporary cyber-physical systems.

Read more: *https://link.springer.com/book/10.1007/978-981-16-5847-1#about*.

Urban Soils – Principles and Practice

Edited by Andrew W. Rate. Published in the series Progress in Soil Science by Springer in 2022, XII, 446 pages, 1 b/w illustration, hardcover ISBN 978-3-030-87315-8, softcover ISBN 978-3-030-87318-9, eBook ISBN 978-3-030-87316-5, price hardcover EUR 175.99, price eBook EUR 128.39.

Urbanisation of the world's population is an increasing trend; in China, for example, the proportion of the population living in cities increased from 13% in 1950 to 45% in 2010 (World Bank data). Australia is one of the world's top ten urbanised countries with population greater than ten million, with approximately 90% of its population living in cities, mainly along Australia's coast. The most rapidly urbanising populations are currently in nations of the African continent. Soils in urban areas have multiple functions which are becoming more valued by urban communities: soils supply water, nutrients and physical support for urban plant and animal communities (parks, reserves, gardens), and are becoming increasingly valued for growing food.

This book is designed primarily as an educational text, presenting the importance of urban ecosystems and the impacts of global change. It examines pedogenesis of urban soils: natural materials affected by urban phenomena, and natural processes acting on urban materials, including an examination of different climatic zones. There is a focus on soils formed on landfill, reclaimed land, dredge spoils as well as soil-related changes in urban geomorphology

Read more: *https://link.springer.com/book/10.1007/978-3-030-87316-5#about*.

Soil Organic Carbon and Feeding the Future

Basic Soil Processes

Edited By Rattan Lal. 1st edition published in the series Advances in Soil Sciences on December 30, 2021 by CRC Press, 338 pages, 31 Color & 62 B/W Illustrations, ISBN 9781032150673, price hardback GBP 150.00.

Soil organic matter (SOM) is a highly reactive constituent of the soil matrix because of its large surface area, high ion exchange capacity, enormous affinity for water due to hygroscopicity, and capacity to form organo-mineral complexes. It is an important source and sink of atmospheric CO_2 and other greenhouse gases depending on climate, land use, soil and crop management, and a wide range of abiotic and biotic factors, including the human dimensions of socioeconomic and political factors. Agroecosystems are among important controls of the global carbon cycle with a strong impact on anthropogenic or abrupt climate change.

This volume explains pedological processes set-in-motion by increases in SOM content of depleted and degraded soils. It discusses the relationship between SOM content and critical soil quality parameters including aggregation, water retention and transport, aeration and gaseous exchange, and chemical composition of soil air. The book identifies policy options needed to translate science into action for making sustainable management of SOM as a strategy for adaptation to and mitigation of climate change.

Read more: *https://www.routledge.com/Soil-Organic-Carbon-and-Feeding-the-Future-Basic-Soil-Processes/Lal/p/book/9781032150673*.

Plants for Soil Regeneration – An Illustrated Guide

By Sally Pinhey, Institute of Analytical Plant Illustration, UK, Margaret Tebbs, The Natural History Museum, UK. Published in March 2022 by CABI, 192 pages, Hardback

ISBN 9781789243604, Price Hardback GBP 55.00, EUR 63.00, USD 75.00.
This book is a comprehensive, beautifully illustrated colour guide to the plants which farmers, growers and gardeners can use to improve soil structure and restore fertility without the use and expense of agrichemicals. Information based on the latest research is given on how to use soil conditioning plants to avoid soil degradation, restore soil quality and help clean polluted land.
There are 11 chapters: 1 to 6 cover soil health, nitrogen fixation, green manures and herbal leys, bacteria and other microorganisms, phytoremediators and soil mycorrhiza (plant-fungal symbiosis). Chapter 7 has plant illustrations, with climate range and soil types, along with their soil conditioning properties and each plant is presented with a comprehensive description opposite a detailed illustration, in full colour. Chapters 8 to 10 examine soil stabilisers, weeds and invasive plants, and hedges and trees and the final chapter, contains 5 case studies with the most recent data, followed by an appendix and glossary. The book allows the reader to identify the plants they need quickly and find the information necessary to begin implementation of soil regeneration.
Read more: *https://www.cabi.org/bookshop/book/9781789243604/*.

Advances in Understanding Soil Degradation

Edited by Elmira Saljnikov, Lothar Mueller, Anton Lavrishchev, Frank Eulenstein. Springer Nature Switzerland AG, 2022, series Innovations in Landscape Research. 796 pages, 44 b/w illustrations, 220 illustrations in colour, Hardcover ISBN 978-3-030-85681-6, eBook ISBN 978-3-030-85682-3, price hardcover EUR 252.99, eBook EUR 192.59.
This book informs about knowledge gain in soil and land degradation to reduce or prevent it for meeting the mission of the Sustainable Developments Goals of the United Nations. Essence, extent, monitoring methods and implications for ecosystem functioning of main soil degradation types are characterized in overview chapters and case studies.
Challenges, approaches and data towards identification of degradation in the frame of improving functionality, health and multiple ecosystem services of soil are demonstrated in the studies of international expert teams.
The book consists of five parts, containing 5–12 single chapters each and 36 in total. Parts are explaining (I) Concepts and Indicators, (II) Soil Erosion and Compaction, (III) Soil Contamination, (IV) Soil Carbon and Fertility Monitoring and (V) Soil Survey and Mapping of Degradation.
Read more: *https://link.springer.com/book/10.1007/978-3-030-85682-3*.

Global Degradation of Soil and Water Resources – Regional Assessment and Strategies

Edited by Rui Li, Ted L. Napier, Samir A. El-Swaify, Mohamed Sabir, Eduardo Rienzi. Springer, Singapore, 2022. 564 pages, 62 b/w illustrations, 221 illustrations in colour, Hardcover ISBN 978-981-16-7915-5, eBook ISBN: 978-981-16-7916-2, price hardcover EUR 241.99, eBook EUR 181.89.
This book focuses on soil and water conservation at global scale. It is a serious environmental problem that will threaten the socio-economic well-being of the majority of global population in future. The book examines the current situation of land degradation in multiple regions of the world and offers alternative approaches to solve the problems through sharing advanced technologies and lessons learned. It provides comprehensive assessment on characteristics, level and effect of degradation in different regions. It's a highly informative reference both for researchers and graduate students.
Read more: *https://link.springer.com/book/10.1007/978-981-16-7916-2#about*.

Multi-Scale Biogeochemical Processes in Soil Ecosystems: Critical Reactions and Resilience to Climate Changes

Edited by Yu Yang, Marco Keiluweit, Nicola Senesi, Baoshan Xing, first published 9 March 2022, John Wiley & Sons, Inc. – IUPAC Series on Biophysico-Chemical Processes in Environmental Systems. Print ISBN:9781119480341, online ISBN:9781119480419,
Multi-Scale Biogeochemical Processes in Soil Ecosystems: Critical Reactions and Resilience to Climate Changes is an up-to-date overview of recent research in soil biogeochemical processes and applications in ecosystem management. Organized into three parts, the text examines molecular-scale processes and critical reactions, presents ecosystem-scale studies of ecological hotspots, and discusses large-scale modeling and prediction of global biogeochemical cycles. This book is essential reading for scientists, engineers, agronomists, chemists, biologists, academic researchers, consultants, and other professionals whose work involves the nutrient cycle, ecosystem management, and climate change.
Read more: *https://onlinelibrary.wiley.com/doi/book/10.1002/9781119480419*.

Soils in Urban Ecosystem

Edited by Amitava Rakshit, Subhadip Ghosh, Viacheslav Vasenev, H. Pathak, Vishnu D. Rajput. First edition published in April 2022 by Springer, XV, 335 pages, 8 b/w illustrations, 72 illustrations in colour, Hardcover ISBN 978-981-16-8913-0, Softcover ISBN 978-981-16-8916-1, eBook ISBN 978-981-16-8914-7; price hardcover EUR 186.99 (incl. VAT), eBook EUR 139.09 (incl. VAT).
DOI *https://doi.org/10.1007/978-981-16-8914-7*.
This book is a compilation of latest work in the field of urban soil management. It explores the global status of urban soils and puts forwards methods for sustainable utilization of urban soils and green spaces. Urban soil study is a new frontier of soil science. Urban soils research is challenging due to complexity of classification, spatial-temporal variability, exposure to pollution and the predominant effect of the anthropogenic factor on soil formation. Management of urban soils and green spaces is an important aspect for developing sustainable spaces. This is a comprehensive collection of information for the students, researchers, landscape architects understanding and maximizing the benefits of soils in urban ecosystems.
Read more: *https://link.springer.com/book/10.1007/978-981-16-8914-7*.

Fractional Calculus for Hydrology, Soil Science and Geomechanics – An Introduction to Applications

By Ninghu Su. First edition published 30 May 2022 by CRC Press, 358 Pages, 1 color & 9 b/w illustrations, paperback ISBN 9780367517038, price paperback GBP 57.95.
This book is an unique integrated treatise, on the concepts of fractional calculus as models with applications in hydrology, soil science and geomechanics. The models are primarily fractional partial differential equations (fPDEs), and in limited cases, fractional differential equations (fDEs). It develops and applies relevant fPDEs and fDEs mainly to water flow and solute transport in porous media and overland, and in some cases, to concurrent flow and energy transfer. It is an integrated resource with theory and applications for those interested in hydrology, hydraulics and fluid mechanics. The self-contained book summaries the fundamentals for porous media and essential mathematics with extensive references supporting the development of the model and applications.
Read more: *https://www.routledge.com/Fractional-Calculus-for-Hydrology-Soil-Science-and-Geomechanics-An-Introduction/Su/p/book/9780367517038*.

Current Topics in Soil Science – An Environmental Approach

By Swapna Mukherjee. Published by Springer Cham, 2022. 268 pages, 1 b/w illustrations; hardcover ISBN 978-3-030-92668-7, eBook ISBN 978-3-030-92669-4, price hardcover EUR 153.99, eBook 117.69.
This book presents current environmental issues and their remedies for soil which are mainly based on soil degradation, soil pollution and the effect of climate change on the soil. Adding xenobiotic chemicals or other alterations in the natural soil environment for agricultural, industrial or urban purposes result in a decline in the soil quality due to improper use or poor management, which is a serious environmental problem. The book is divided into five parts – soil science, soil physics, soil chemistry, soil biology and soil environment. The first part "Soil Science" serves as the introduction to the book and discusses some common topics such as soil formation, mineralogy, taxonomy, quality and analytical techniques. The second part "Soil Physics" is mainly concerned with the physical properties and processes of soil and their association with effects on air, water and temperature. Soil Chemistry, the third part, discusses the chemical reactions and processes between inorganic and organic components.The fourth part "Soil Biology" explains the biological properties and processes of the soil, with special concern to microbial diversity and its effect on the ecology. Lastly, the fifth part "Soil Environment" discusses the current environmental problems such as climate change and soil pollution, including processes to mitigate these issues through carbon sequestration, nutrient management and land management.
Read more: *https://link.springer.com/book/10.1007/978-3-030-92669-4*.

In Memoriam

Víctor Hugo Alvarez Venegas

(1938-2022)

Víctor Hugo Alvarez Venegas
(© Brazilian Soil Science Society)

The Brazilian Soil Science Society (SBCS) communicates, with great regret, the death of Víctor Hugo Alvarez Venegas, a professor of Soils Department at the Federal University of Viçosa (UFV), which took place on 19 June 2022. Professor Víctor Hugo was 83 years old, and an honorary member of SBCS.

Born on Ecuador he dedicated most of his career to the UFV and Brazilian soil science. He taught undergraduate and graduate courses for more than 40 years at UFV, and he was the advisor, to some extent, of more than 200 professionals. He was an example of unyielding ethics and moral in science and in life.

He was secretary general and a great enthusiast of the SBCS, becoming General Secretary in 1997 and was vice president from 2001 to 2009. In his term, the SBCS had its structure entirely revised to adjust to IUSS Divisions and Commissions. His strength was behind the proposals of SBCS to host the World Congress of Soil Science in Brazil, which culminated in 2018 with the 18th WCSS in Rio. For the Latin American Soil Science Society (SLCS), Dr. Victor Hugo Alvarez Venegas was a constant support for its regional consolidation and international projection. With him we lose not only a scientist but a good human being.

To Professor Victor, the gratitude of Brazilian and Latin America Soil Science. To the family, the feeling of regret and the condolences of all who admired him and learned from him the love and respect for science and its methods. His death is a great loss not only for SBCS but for SLCS and IUSS.

Hans Joachim Fiedler

(1927-2022)

Hans Joachim Fiedler (© U. Fiedler)

With great sadness we inform that Professor Dr. Dr. h. c. Hans Joachim Fiedler passed away on the 12th of February 2022 in Dresden, Germany. He was 94 years old. Through his extensive work, he made a significant contribution to the development of soil science from a basic agricultural and forestry-based discipline to the integral part of modern environmental science that it is today. Given the multifaceted nature of soils, H.J. Fiedler was an early proponent of the importance of soils as an environmental medium and its decisive interface function for maintaining natural cycles.

Hans Joachim Fiedler was born in Düsseldorf in 1927 and he also spent his school years in the Rhineland.

At the end of World War II, he found himself in central Germany. In 1945 he began to study chemistry, physics, and mineralogy in Jena, where he received his doctorate in 1951 with honors. In Jena he also gained his habilitation in 1957 in the subjects of agricultural chemistry and soil microbiology. This was followed with the appointment as a lecturer for plant nutrition at the University of Rostock. In 1959, at an exceptionally early age of 31, he was appointed as Chair of Soil Science and Site Ecology at the then Faculty of Forestry at Tharandt of the former TH Dresden. Professor Fiedler then continued to lead this institute until his retirement in 1995, and during this very long and turbulent time, he made an extraordinary impression. Regardless of the difficulty of both the material and organizational conditions in the former German Democratic Republic (GDR), Fiedler successfully established a modern and highly efficient laboratory. In leading the research efforts of the institute, he combined the skills of scientists from several forestry-related and natural s ciences with the common goal of establishing methodological foundations and addressing forestry practice and environmental protection issues. Against all odds and difficulties he was able to preserve his soil institute as a place which was largely free of persistent political pressures and interferences. The 'Fiedler Institute' was a shelter ruled by mutual trust and social cohesion. Some of the critical contemporary issues that were addressed by H.J. Fiedler and his team included the heavy metal pollution of the soils in the Freiberg region and the forest decline ('Waldsterben') occurring in the low mountain ranges of the Saxony–Czech–Polish 'black triangle' due to the extremely high sulfur dioxide levels emitted during this period. This was anything but opportune under the political conditions of the GDR.

As a rhetorically talented teacher at the university, Hans Joachim Fiedler played a fundamental role in shaping several generations of students and graduate researchers. In addition to supervising a large number of graduating students, his more than 15 specialist books and more than 600 publications are a testament to his almost inexhaustible zeal. His great scientific contribution is also clear from his extensive collaboration with various scientific journals, both within the GDR and internationally. Although his contacts with colleagues in the other half of Germany and other western countries were made very difficult, or even outright prevented until the political change in 1989, the reputation of H.J. Fiedler continued to grow outside of eastern Germany. This high international reputation is reflected in his receiving several honorary doctorates, including from Munich in 1988, Trier in 1989, and Uppsala (Sweden) in 1995.

During the challenging period following the reunification of Germany, as Dean of the then Faculty of Construction, Water Resources, and Forestry (1990-1994), H.J. Fiedler helped significantly to shape the process of self-renewal underway at the TU Dresden (TUD), both through his scientific reputation and through his personal integrity. However, some of his most far-sighted ideas – such as the faculty's orientation towards a platform for interdisciplinary environmental research with a significant involvement of soil sciences – were not feasible then, the time was not yet ripe for that! All the more, it filled him with satisfaction that much of what he intended at that time was put into practice at the current Faculty of Environmental Sciences in TUD which is labelled as one of 11 Excellence Universities in Germany. His commitment to the 'International Environmental Management Training Program' at the 'Center for International Postgraduate Studies in Environmental Management' (CIPSEM) has also paid great dividends. This training facility, which is run in cooperation with the United Nations Environment Program (UNEP) and UNESCO, has been in operation at TUD since 1977. Hans Joachim Fiedler not only made a significant contribution to CIPSEM in helping it to survive the political transition, but has also been responsible for the development of its curriculum and organization, and it now has a large network of > 2,500 graduates worldwide.

Hans Joachim Fiedler was appointed honorary member of the German Soil Science Society (DBG) in 1993. He was also an honorary member of the German UNESCO Commission and an active member of the Saxon Academy of Sciences at Leipzig. After retirement he devoted himself more to his family and traveling. Nevertheless, he continued to take a keen interest in the activities of his 'old' institute. It was a memorable event to listen to his retrospect when the university and the DBG celebrated his 90th birthday with an honorary colloquium.

Beyond his undeniable scientific skills, he was deeply human and a very social person with a fine sense of humor. His kindness, availability, and great modesty have always made us admiring him. We will remember him as outstanding personality, colleague, and scientist.

By Karl-Heinz Feger, TU Dresden, Germany
President of the German Soil Science Society (DBG)

H.J. Fiedler with Rattan Lal, then IUSS President, on the occasion of his honorary degree award at TU Dresden in 2015 (© K.H. Feger)

James Patrick Quirk

(1924-2022)

Jim Quirk was a Reader in Soil Science at the Waite Agricultural Research Institute from 1956-1962. He then became the Foundation Professor of Soil Science and Head of the Department of Soil Science and Plant Nutrition at the University of Western Australia from 1963 to 1974. In 1974 he returned to the WAITE Agricultural Research Institute, at the University of Adelaide as Director until his retirement in 1991. Jim Quirk was a renowned soil scientist who helped shape soil science in Australia with a very large number of very significant scientific papers and many significant awards, including the Prescott, AIAS, Farrer Memorial and Mueller Medals, as well as receiving the Order of Australia for his contributions. Since 1998 he was an Honorary Member of IUSS.

Read more:
https://www.science.org.au/profile/jim-quirk and *https://www.eoas.info/biogs/P000727b.htm#:~:text=James%20Quirk%20was%20Reader%20in,of%20Western%20Australia%201963%2D1974.*
Soil Science Australia acknowledges Jim's tireless contribution to soil science and offers its sincere sympathy to Jim's family and friends.

Based on text from Associate Professor Vanessa Wong CPSS, Federal President of Soil Science Australia

Georges Stoops

(1937-2022)

Georges Stoops (© Sari Stoops, permission to use provided by the Spanish Journal of Soil Science)

Georges Joseph Stoops was born in 1937 in Antwerp (Belgium). He studied Geology and Mineralogy at Ghent University, where he obtained his PhD degree in 1966. He worked at Lovanium University (DR Congo) from 1962 to 1966, as assistant and lecturer, and in 1968 he was appointed to Ghent University (UG), where he became Full Professor in 1987, and Emeritus Professor in 2002. Georges was Chairman of the Department Geology and Soil Science (1993-2001), Director of the "International Training Centre for Post-Graduate Soil Scientists" (UG), and Vice-president of the Steering Committee of Development Cooperation of the Flemish Interuniversity Council (1999-2002), among other tasks. He developed a very intense collaboration with universities around the world, through common projects and also as guest lecturer.
Georges' most relevant contributions to soil science were in the field of soil micromorphology. This discipline lacked a coherent, internationally accepted analytical system until 1969, when the ISSS (now IUSS) created a working group to develop common guidelines for the study of soil thin sections. This resulted in the publication of a handbook by Peter Bullock, Amilius Jongerius, Nicolas Fédoroff, Tatiana Tursina and Georges Stoops in 1985, with precisely defined concepts and terms, which was widely used. Georges Stoops prepared a revised version that was published by the Soil Science Society of America in 2003; and even in 2021, when he published a second edition of these guidelines. Besides his work on concepts and terms, translated to many languages, he also published two essential books dealing with interpretation of soil micromorphological features (2010, 2018), becoming the only soil micromorphologist from the initial team who was currently active. His contributions were not only methodological or conceptual, but represented very important advances in the understanding of soil systems under volcanic, tropical, arid (gypsum and carbonates) and temperate environments, as well as in related disciplines as geoarchaeology.
In parallel, his teaching activity was very intense, especially in the soil micromorphology courses of the Master's Degree in Soil Science at Ghent University, as well as in multiple specialization courses and through the supervision of master's and doctoral theses. This resulted in the international dissemination of this discipline, and

in the existence, at present, of a whole generation of soil micromorphologists around the world who benefited from his knowledge and wisdom. During 2022, he was planning to attend the micromorphology courses in Tremp and Krakow, which shows his energy and his desire to pass on his knowledge to young researchers. Thanks to his many contributions, both in teaching and research, he was awarded the Dokuchaev medal of the All Union of Soviet Soil Scientists of the Academy of Science (1985), the Kubiëna Medal of the International Soil Science Society (1992), and the Philippe Duchaufour Medal of the European Geosciences Union (2010). In 2018, on the occasion of his 80th birthday, the Spanish Journal of Soil Science dedicated a special issue to him with selected contributions from the 15th International Conference on Soil Micromorphology (*https://sjss.es/index.php/sjss/issue/view/177*).

Those of us who were lucky to learn and work with Georges will remember him as a tireless researcher, full of curiosity and enthusiastic about his work, who never avoided a question or a doubt from a student or colleague. His human quality, his approachability and kindness were on a par with his quality as researcher. His legacy will remain forever in his works and teachings; and his friendship and example will not disappear but multiplied in the people who knew and learned from him. Rest in Peace, Georges.

By Rosa M Poch
Chair (2010-2018) and Vice-chair (2006-2010) of IUSS Commission 1.1. Soil Morphology and Micromorphology
IUSS Honorary Member

IUSS Honorary Members and Award Winners

IUSS Honorary Members

Year	Member	Country
1924	L. Cayeux †	France
	K. Glinka †	USSR
	Jos. Kopecky †	Czechoslovakia
	G. Murgoci †	Romania
	E. Ramann †	Germany
	Sir John Russell †	UK
	S. Winogradski †	USSR
1927	P. Treitz †	Hungary
1935	E.A. Mitscherlich †	Germany
	A. d'Sigmond †	Hungary
	J. Stoklasa †	Czechoslovakia
	G. Wiegner †	Switzerland
1950	A. Demolon †	France
	D.J. Hissink †	Netherlands
	W.P. Kelley †	USA
1954	S. Mattson †	Sweden
	E. Truog †	USA
1956	G. Bertrand †	France
	E.C.J. Mohr †	Netherlands
1960	F.A. Bear †	USA
1964	J.A. Prescott †	Australia
1968	F. Hardy †	UK
	W.L. Kubiena †	Germany
	L.A. Richards †	USA
	A.A. Rode †	USSR
1974	R. Bradfield †	USA
	G.V. Jacks †	UK
	Ch.E. Kellogg †	USA
	M.K. Kononova †	USSR
	A. Oudin †	France
	F. Scheffer †	Germany
1978	G. Barbier †	France
	V. Ignatieff †	Canada
	Y. Ishizuka †	Japan
	L. Krolikowski †	Poland
	L. Vettori †	Brazil

Year	Member	Country
1982	Ph. Duchaufour †	France
	W. Flaig †	Germany
	V. Kovda †	USSR
	E. Mueckenhausen †	Germany
	E.W. Russell †	UK
1986	H. Jenny †	USA
	D. Kirkham †	USA
	S.K. Mukherjee †	India
	R. Tavernier †	Belgium
1990	G. Aubert †	France
	E.G. Hallsworth †	Australia
	J.S. Kanwar	India
	P. Schachtschabel †	Germany
	R.W. Simonson †	USA
	I. Szabolcs †	Hungary
1998	G.H. Bolt †	Netherlands
	R. Dudal †	Belgium
	K.H. Hartge †	Germany
	M. Kutilek †	Czech Rep.
	J. Quirk †	Australia
	W.G. Sombroek †	Netherlands
	K. Wada	Japan
	D.H. Yaalon †	Israel
	S.V. Zonn †	Russia
2002	Richard W. Arnold	USA
	Gleb V. Dobrovolsky †	Russia
	Wilford Gardner †	USA
	Hassan M. Hamdi †	Egypt
	Luis A.L. Sarmiento †	Colombia
	Fiorenzo Mancini †	Italy
	Boris S. Nosko	Ukraine
	Ramon Rosell †	Argentina
	Alain Ruellan †	France
	Akira Tanaka †	Japan
	Bernard H. Tinker	UK

Year	Member	Country
2004	Winfried E.H. Blum	Austria
	Hans-Peter Blume	Germany
	Johan Bouma	Netherlands
	Seong-Jin Cho †	S Korea
	Jan Glinski †	Poland
	Marcel G.H. Jamagne †	France
	Donald R. Nielsen †	USA
	Hans V. van Baren †	Netherlands
	Larry P. Wilding †	USA
2008	Christian Feller	France
	Kikuo Kumazawa	Japan
	Kazutake Kyuma	Japan
	John Ryan	Ireland
	Bob A. Stewart	USA
	Victor Targulian	Russia
	György Varallyay †	Hungary
	Jai Singh Pal Yadav †	India
2012	Jai-Joung Kim	Korea
	John M. Kimble	USA
	Ahmet Ruhi Mermut	Canada
	Nicola Senesi	Italy
	Donald L. Sparks	USA
	Robert E. White	Australia
2016	I. P. Abrol	India
	Jaume Bech	Spain
	Maria Gerasimova	Russia
	Martin H. Gerzabek	Austria
	Mary Beth Kirkham	USA
	Josef Kozak	Czech Republic
	Stephen Nortcliff	United Kingdom
	Marcello Pagliai	Italy
	Piotr Sklodowski	Poland
	Karl Stahr	Germany
	Roger Swift	Australia
	Tengiz F. Urushadze †	Georgia
	Jae Yang	Korea

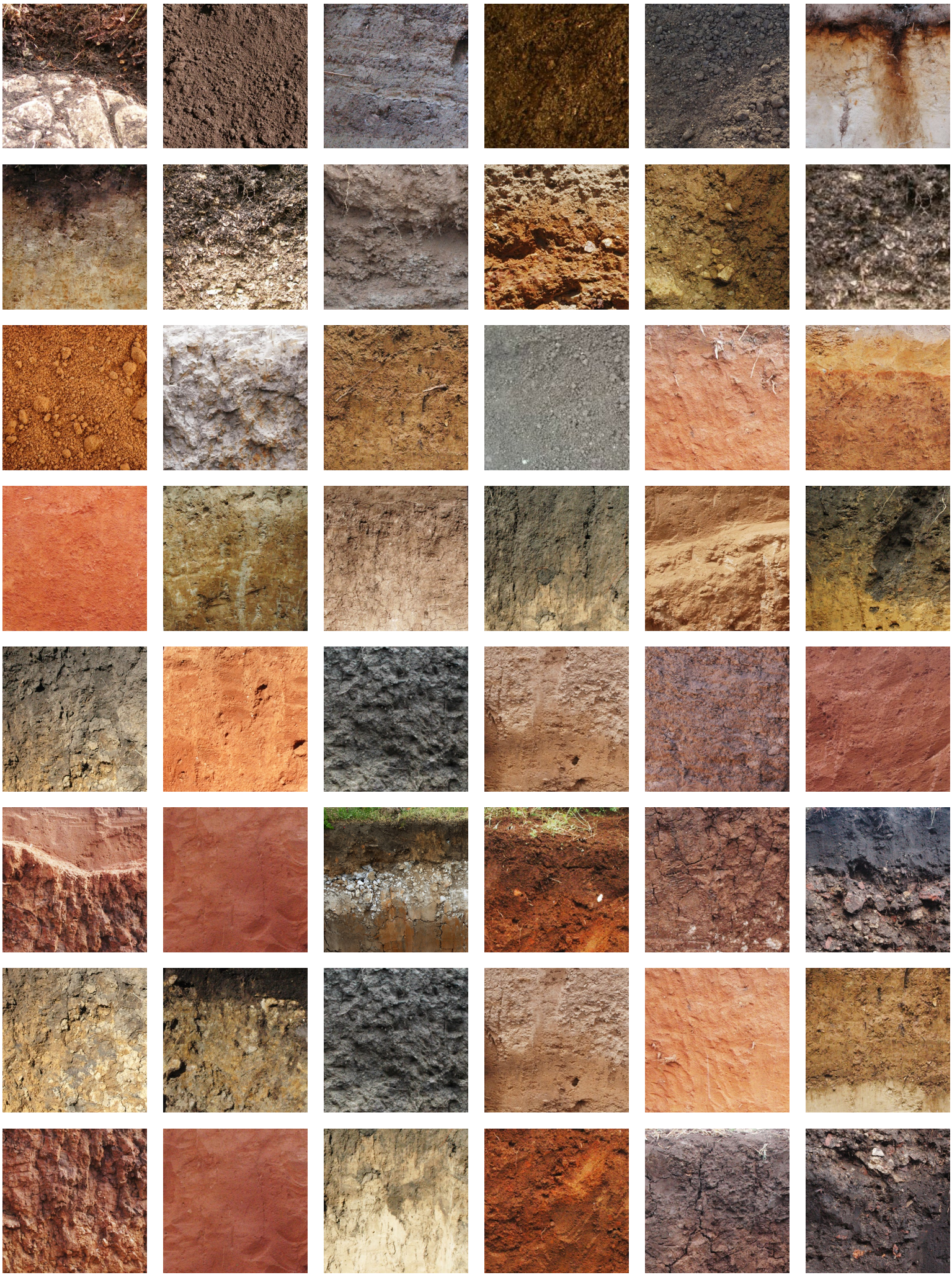
Year	Member	Country
2020	Jozef A. (Seppe) Deckers	Belgium
	Flavio Anastacio de Oliveira Camargo	Brazil
	Rainer Horn	Germany
	Carmelo Dazzi	Italy
	Kazuyuki Inubushi	Japan
	Kye-Hoon 'John' Kim	Korea
	Bal Ram Singh	Norway
	Pavel Krasilnikov	Russia
	Rosa M. Poch Claret	Spain
	Alfred Hartemink	USA

IUSS Award Winners

Dokuchaev Award		
Year	Member	Country
2006	Victor Targulian	Russia
2010	Dan Yaalon †	Israel
2014	Alex McBratney	Australia
2018	Johan Bouma	Netherlands
2022	Nikola Senesi	Italy

Von Liebig Award		
Year	Member	Country
2006	Rattan Lal	USA
2010	Don Sparks	USA
2014	Magdi Selim †	USA
2018	John Ryan	Ireland
2022	Yong-Guan Zhu	China

Jeju Award		
Year	Member	Country
2018	John Bennett	Australia
2022	Umakant Mishra	USA



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