

IUSS Bulletin

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International
Year of Soils

126

International Union of Soil Sciences (IUSS)

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All contributions are welcome and should be sent to iuss@umweltbundesamt.at.

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IUSS reports

Report from the IUSS Secretariat

New IUSS Secretariat established

In January 2015 the IUSS established the new Secretariat which is located in Vienna, Austria, in order to guarantee a high level of continuity and coherence in supporting the activities of the IUSS.

Under the umbrella association BIOS Science Austria (Association for the Advancement of Life Sciences, www.bios-science.at) the Umweltbundesamt (Environment Agency Austria, www.umweltbundesamt.at/en/) provides the secretariat led by Sigbert Huber. Financial support comes from IUSS and, in Austria, from the Federal Ministry of Agriculture, Forestry, Environment and Water Management, the Federal Ministry of Science and Research and the University of Natural Resources and Life Sciences, Vienna, as well as from the Agency for Health and Food Safety.

The Permanent Secretariat works closely with the President who will be elected every two years. Whereas the President, supported by the President Elect and Past President, is responsible for the scientific guidance of the IUSS and its bodies, the Permanent Secretariat shall manage the activities of the IUSS and support the organisers of the next world congresses, in particular the Vice President Congress, in their preparatory work.

Meeting of the IUSS Executive Committee

On January 16 the IUSS Executive Committee met in Vienna to discuss the operational implementation of the new structure of the IUSS, in particular the tasks and actions the Secretariat, the Presidents, the Treasurer, the Division chairs and the Standing Committees will provide in the year 2015. Further topics on the agenda of this fruitful meeting at the new IUSS headquarters were international cooperations as well as the new IUSS website and publications.

Relaunch of IUSS website

In January 2015 the new IUSS Secretariat and the new IUSS webmaster took up their new duties.

After a transition phase of two months the IUSS website was transferred from a server in Austria-

lia to a server in Austria, but the internet domain remained the same. With this transition the IUSS Secretariat took the opportunity to set up a new website with a modern content management system and design. The contents from the current IUSS website were transferred to the extent possible to the new website, albeit partly rearranged.

IUSS Stimulus Fund

IUSS has established an annual Stimulus Fund principally to support activities within the Commission and Working Groups, but where appropriate will support activities to assist the development of Soil Science in regions of the world where activities are limited through lack of resource.

IUSS has set aside a sum of \$12,500 annually to help fund these 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.

The initial application process requires a short written proposal of no more than 500 words plus a budget indicating how the funds awarded are to be spent. There are three submission dates for applications in 2015: 15 March, 15 June and 15 September. Urgent applications may be considered outside these times with the approval of the President. Applications should be sent to iuss@umweltbundesamt.at

The funds can be used for a wide range of activities; the principal aim is the promotion of Soil Science. In 2015 activities might include events related to the International Year of Soils. Other activities might include the support of meetings, assistance with travel, website development, travel matching funds and indeed any other soil science-related undertaking that stimulates work of a Commission or Working Group. Where funds for meetings or travel are requested, monies from the IUSS Stimulus Fund shall normally be used to match funds raised locally. The relation between IUSS money and local funds shall depend on the local economic circumstances.

The IUSS Executive Committee shall evaluate the proposals and make recommendation to the President. Final approval will be given by the IUSS



President or delegate within one month after the submission dates given above.

Because of the strict auditing regime that IUSS operates under, full accounting of all expenditure must be provided to the Treasurer. All expenditure must be accompanied by appropriate receipts. Under normal circumstances approximately 50 % of the allocated funds will be paid in advance, with the balance paid on receipt of a summary of expenditure with accompanying receipts. These conditions may be varied at the discretion of the President.

On completion of the activity a full financial statement with invoices/receipts for all expenses must be submitted to the Executive Committee within 2 months. A short (500-1000 words) report of the activity must be presented for inclusion in the IUSS Bulletin within 2 months of completion.

Report of Division 2: 'Soil properties and processes'

by Kazuyuki Inubushi, Division Chair

The main activities of Division 2 were to organize one Inter-Divisional Symposium (Critical issue of radionuclide behaviour in soils and remediation) and two Divisional Symposia (Soil development and soil properties and functions: Modelling of soil properties and processes – challenges and opportunities) during the 20th World Congress of IUSS in Jeju, Korea, which received a large number of oral and poster presentations. Divisional meeting was also held in Jeju to discuss further activity plan especially in the International Year of Soil, 2015. The division chair contributed to present paper in the IUSS Global Soil C Conference in Madison and the proceedings book published by Springer.

Report of Commission 2.1 Soil Physics

by Stephan Peth, Commission Chair

During the 20th World Congress of IUSS, in Jeju, Korea, the Soil Physics Commission 2.1 organized three symposia. A range of interesting talks were given providing the latest information on the *Bio-physical Aspects of Soil Functions*, the *Quantification of Evaporative Fluxes from Terrestrial Surfaces* and on *Hydro-Ecological Observatories and Advances in Soil Measurements and Sensors*. More than 50 Posters complemented the oral program and contributions were made from 19 countries. Presentations covered topics like hydrophobicity, scaling and spatial variability of physical properties, soil structure and its function in ecosystems, new techniques to measure hydraulic properties and vapour exchange with the atmosphere, and the application of remote sensing, non-invasive tomography and tracer techniques for quantifying soil management effects on physical soil properties across scales and many more. Worthwhile noting is that three renowned soil physicists (Rattan Lal, Magdi Selim and Johan Bouma) were invited as plenary speakers highlighting the importance of soil physics as a discipline to support soil security.

Further contributions of Commission 2.1 are planned for the upcoming conference on *Soil Functions and Climate Change - do we underestimate the consequences of new disequilibria in soil properties?* - SUSTAIN hosted in Kiel, Germany on 23-

26 Sept. 2015 and the *Third Brazilian Soil Physics Meeting (3rd BSPM)* on 4-8 May, 2015, Curitiba, Paraná State, Brazil. Further information is provided under <http://www.soils.uni-kiel.de/de/sustain-2015> and <http://www.agrarias.ufpr.br/portal/bspm2015/>. Also on behalf of my co-chair Tsuyoshi Miyazaki I thank all for their contribution to make the soil physics symposia during the WSSC in Jeju a success. We are looking forward to a fruitful and vital upcoming period in which we have the pleasure to chair Commission 2.1 with hopefully many contributions from the soil physics community making our soils 'physically' fit for meeting future challenges.

Report of Commission 2.2 Soil Chemistry

by Boris Jansen, Commission Vice-Chair

The primary activity of Commission 2.2. in 2014 was the organization of three symposia at the 20th World Congress of Soil Science in Jeju, Korea entitled: 1) Biogeochemical Reactivity of Soils and Sediments: Molecular Process Control over Material Flux at Field Scales; 2) Soil Organic Carbon: Dynamics, Stabilization, and Environmental Implications; 3) Behavior and Fate of Pollutants Entering the Soil Environment. All three sessions were very successful and sparked a lively scientific exchange. In addition, during the 20th World Congress a new Chair and Vice-Chair of Commission 2.2. were installed in the persons of respectively Phillipe Baveye (Rensselaer Polytechnic Institute, New York, USA) and Boris Jansen (University of Amsterdam, The Netherlands). They look forward to a fruitful collaboration to strengthen the position of and collaboration within the field of soil chemistry worldwide in the coming years. This will take shape inter alia by endorsing relevant sessions at international conferences and strengthening the ties with other fora such as the European Geosciences Union (EGU). A first step for this has been the initiation of contact with the Chair of the EGU Soil System Science Division and the endorsement of session SSS6.3 'Biogeochemical processes in terrestrial ecosystems: New methodological perspectives to trace organic matter cycling and transformation in soils, sediments and the liquid phase' at the EGU General Assembly in Vienna, Austria in 2015.

Report of Commission 2.3 Soil Biology

by Ellen Kandeler, Commission Chair

Commission 2.3 Soil Biology organized three symposia during the 20th World Congress of IUSS, in Jeju, Korea. The symposium of '*Life in Soils – Distribution and Function of Soil Microorganisms in a Changing Environment*' aimed to improve the understanding of multi-scale distribution and function of soil microorganisms. Of particular interest was how the spatial distribution of microorganisms affects microbial functioning in soil and how this modulates the microbial response to different environmental changes (e.g. soil management, climate change). Claire Chenu, Grignon, France, gave an excellent invited talk about the general theme of the symposium. In addition, Commission 2.3 Soil Biology co-organized the 'First Global Soil Biodiversity Conference', which was held in Dijon from the 2nd to the 5th of December 2014. IUSS supported four students with Travel Awards to attend to this conference. Ellen Kandeler as the new chair of Commission 2.3 Soil Biology of IUSS is currently planning future activities of her commission. Commission 2.3 will contribute to the conference 'Ecology of Soil Microorganisms', which will be held in Prague, Czech Republic, from November 29 to December 3, 2015.

Report of Commission 2.4 Soil Mineralogy

by Balwant Singh, Commission Chair

The primary activities of Commission 2.4 were the organisation of three symposia at the 20th World Congress of Soil Science in Jeju, Korea in 2014. The symposia (i) 'Mineralogy and Reactivity of Soil Microsites' organised by Dean Hesterberg (Past-Chair) and Markus Grafe; (ii) 'Roles of Minerals as Suppliers and Regulators of Plant Nutrients' organised by Balwant Singh (Current Chair), David Manning and Laurent Caner; and (iii) 'Minerals as Regulators of Carbon Flow through Soils' organised by Balwant Singh (Current Chair) and Markus Kleber were well attended and there were keynote presentations in all the symposia. Stephen Hillier, the current vice-chair of Commission 2.4, is the Conference Chair for Euroclay 2015 and a symposium '*Clays in the Critical Zone: soils, weathering and elemental cycling*' is being held at the conference. The symposium organisers are Paul A. Schroeder (University of Georgia), Jason Austin (University of Georgia), Bruno Lanson (University of Grenoble) and Steve A Banwart (University of Sheffield).

Report of Commission 2.5 Soil Chemical, Physical and Biological Interfacial Interactions

by Siobhan Staunton, Commission Chair

Commission 2.5 organised two sessions at the World Congress in June 2014. Jon Chorover introduced the session *Advances in Techniques to Investigate Chemical, Physical and Biological Interfaces in Soils* with a comprehensive and penetrating keynote talk entitled *Combining advanced analytical methods to assess interfacial change during bioweathering of silicates and sulfides: Mineral-organic-microbe interactions alter bioaccessibility of toxic metal(loid)s*. Geertje Pronk gave an excellent overview of recent advances entitled *Congruent development of microbial communities, organic matter and surface properties in artificial soils with different mineral composition and charcoal presence* in her keynote talk for the session *How do Interactions with Organo-Mineral Surfaces Alter the Dynamics and Properties of Microbes and Macromolecules in Soil ?* The next interCongress conference, better known as ISMOM, will be held in Montreal, July 7-10, 2015, with the theme *Soil Interfaces for Sustainable Development*. Keynote talks will be given by John Duxbury (Integrative Plant Science, Cornell, USA), Stephan Kraemer (Environmental Geosciences, Vienna, Austria), Beverly Hale (Environmental Sciences, Guelph, Canada), Kornelia Smalla (Epidemiology and Pathogen Diagnostics, Julius Kuhn Institut, Germany), Claire Chenu (Ecology & Environmental Sciences, Paris, France) and Peter Leinweber (Soil Science, Rostock, Germany).

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

by Christian Feller, Division Chair

Division 4 has published its first biannual newsletter SOIL CONNECTS in December 2014 covering a Division Chair's Report, stories, issues, events from the members of Division 4. Just as importantly this newsletter will contribute to a suite of newsletters already produced within the IUSS and will give its members the opportunity to share their knowledge of soil with other members and the broader community. It is available at the IUSS website: http://www.iuss.org/files/division_4_newsletter_issue_1.pdf.

A more detailed report will follow in the next Bulletin.

Report of Working Group on Digital Soil Mapping

by Luboš Borůvka, WG Vice-Chair and
Mogens H. Greve, WG Chair

The Working Group on Digital Soil Mapping (WG DSM) was established at the first Global Workshop on Digital Soil Mapping in Montpellier, France, in 2004. The objectives of the Working Group include introducing, inventing and providing methodologies, procedures and guidelines for digital soil mapping, creating and populating geographically referenced soil databases, processing and combination of spatial soil information, field observations, laboratory analyses and environmental data using quantitative relationships and models, and providing tools and products, like digital soil maps and georeferenced soil databases, for end users.

The Working Group on Digital Soil Mapping is related to and cooperates with the IUSS commissions 1.2 Soil Geography and 1.5 Pedometrics. The WG is organized on a voluntary basis; it does not have a formal membership. Whoever works in the field of DSM and attends the global workshops on DSM can be considered a member of the WG. The WG consists from specialists, researchers, academicians, as well practitioners from all over the World.

Activities of the Working Group on Digital Soil Mapping

The principal activity of the WG DSM is organizing biannual meetings, Global Workshops on Digital Soil Mapping. Further more we arrange session on DSM on larger meeting e.g the WCSS meeting in Korea in 2014, where new advancements, methods and products are presented and information is exchanged.

Key issues discussed during the recent meetings included:

- Data collection, acquiring new input information and auxiliary data (especially remote sensing, proximal soil sensing, digital terrain model data etc.); data combination
- Soil and environmental sampling optimization for DSM purposes
- Scorpan model functions (classification and regression trees, random forests, artificial neural networks, etc.)
- Introducing new methods and models and modification of the older ones
- Exploitation and processing of legacy data
- Mapping scale issues, upscaling and downscaling, maps disaggregation; harmonization of maps of different origin
- Map uncertainty assessment
- Visualization of the DSM products
- Applications of DSM (e.g. soil organic carbon mapping, soil degradation maps)
- DigitalSoilMap.net project

Global Workshops on Digital Soil Mapping

- 2004 – Montpellier, France
- 2006 – Rio de Janeiro, Brazil
- 2008 – Logan, Utah, USA
- 2010 – Rome, Italy
- 2012 – Sydney, Australia
- 2014 – Nanjing, China
- 2016 – Arhus, Denmark
- 2017 – proposed joint meeting with Commission 1.5 Pedometrics and working groups on Proximal Soil Sensing, Monitoring, and Modelling of Soil and Landscape Evolution

International Cooperation

IUSS booth at EGU General Assembly in Vienna

The IUSS successfully presented itself at booth No. G19 of the European Geosciences Union (EGU) General Assembly 2015, Vienna, Austria, April 12-17, 2015. EGU 2015 attracted more than 12,000 participants bringing together geoscientists from all over the world, covering all disciplines of the Earth, planetary and space sciences. The IUSS took this opportunity to present a new flyer and posters, which were well received. The World Soil Map according to WRB and US Soil Taxonomy respectively were displayed, showing the diversity of soils around the planet. A globe showing the world's soils attracted particular attention. Another highlight was the announcement of the 21st World Congress of Soil Science (WCSS), which will take place in Rio de Janeiro, Brazil, August 12-17, 2018. In addition, a wide array of information material from the national soil science societies was made available to the participants. Rainer Horn, IUSS President, gave a speech on soil strength in the course of session *Soils of the world: from natural to urban soils*. Another one of his speeches on Soil Science Societies and their role for improving soil governance at a global level, held in Brazil, was made available at the booth.

Global Soil Week

Global Soil Week 2015: Soil. The Substance of Transformation, Berlin, Germany, April 19-23, 2015. Sustainable soil management and responsible land governance are fundamental to achieving a range of proposed goals and targets. As soils play a crucial role in poverty and hunger eradication, in creating sustainable cities, mitigating climate change and maintaining water security. Therefore, the Global Soil Week 2015 was set in the light of the new Sustainable Development Agenda and homed in on the following questions: How can soil and land contribute to achieving the proposed goals? And how can the diverse soil- and land-related constituencies ensure that we meet this global challenge successfully?

More than 600 participants from more than 80 countries were present. The IUSS as partner of the Global Soil Week was represented by President Rainer Horn, President Elect Rattan Lal and Honorary member Winfried Blum. Rainer Horn spoke at the plenary *Towards an integrated perspective on the Post-2015 Development Agenda*. Rattan Lal

gave a presentation on the interplay of soils and climate during session 1.4 Mitigation and adaptation to climate change through sustainable land management – Global and national perspectives on challenges and opportunities. Winfried Blum represented the IUSS as one of the hosts of the session 3.6 Soil fertility management – towards a joint paradigm. For more details see <http://global-soilweek.org/global-soil-week/gsw-2015>

OGC seeks participants for international Soil Data Interoperability Experiment

Contact: info@opengeospatial.org

7 May 2015 – The Open Geospatial Consortium (OGC) has announced a Call for Participation (CFP) in the OGC Soil Interoperability Experiment (Soil IE).

2015 is the **International Year of Soils**. The need for an improved understanding of soil distribution, function and state has never been more important to support science and policy development, to improve agricultural productivity in a sustainable manner and to address other global issues such as climate change and biodiversity decline. This understanding needs to be underpinned by quality-assessed soil data and information that can be organised, aggregated and made accessible in a consistent granular and consumable form.

Modern digital soil mapping modelling techniques are of great value for decision support but these models often depend on dispersed, inconsistent and difficult-to-access digital data. Clearly modern, harmonized and interoperable information systems are required to integrate these data into a consistent set of soil information. Various initiatives have started work on the soil data integration problem by defining soil information models. A few examples include: the European INSPIRE, e-SOTER and ISO 28258 (SoilML); the international GlobalSoilMap.net consortium, and the Australian and New Zealand ANZSoilML projects. The **UN FAO Global Soil Partnership** recognise the value of all of these projects, particularly for Pillars 4 (Global Soil Information System) and 5 (Harmonization). Nevertheless, we still have a situation where we must reconcile multiple systems that often have the same objectives.

Harmonizing inconsistent data is a time-consuming process – some estimates state that 80% of a sci-



entist's time can be occupied getting data into a state where it can be analysed. This process must be repeated with each project. The OGC Soil Data IE aims to reverse that by allowing data integration to be automated as much as possible.

To this end the **International Union of Soil Sciences (IUSS) Working Group on Soil Information Standards (WGSIS)** is working to consolidate these information models and reconcile them into a single language for the exchange of globally consistent soil information. WGSIS is not expecting participants to change their information systems; instead the goal is to develop a common soils data model which each system uses to communicate with all other soil information systems.

The WGSIS proposes validating the soils data model by running an **Open Geospatial Consortium (OGC)** interoperability experiment. The OGC has a strong environmental focus. Active OGC working groups address data issues for agriculture, geology, hydrology, groundwater, climate and Earth observations. An OGC Interoperability Experiment is a rapid, low overhead, formally structured OGC-facilitated activity in which members achieve specific technical objectives that further the OGC Standards Baseline. The soil interoperability experiment will refine and test SoilML2, consolidating existing soil standards by testing them (through working implementations) against an agreed set of use cases for the exchange and analysis of soil data. To do this WGSIS needs global support and acceptance, building a globally representative community that provides both domain and technical expertise to this project. While the OGC is a member-driven organisation, and WGSIS needs a core of OGC members to support and initiate this work, non-members can participate in an 'observer' status.

The initiators ask for interested organizations to indicate their support and commitment to be involved in this interoperability experiment. Potential participants are invited to attend the upcoming **OGC Technical Committee meeting in Boulder Colorado** to learn more. Participants in the OGC Soil Data IE, which will run until December 2015, will test implementations and provide constructive comments on the exchange data model and resulting trial documentation. Experience has shown that those working in these initiatives gain valuable insights that can be used to improve existing information systems or fast-track the development

of new systems. Those that participate will gain sufficient expertise to start deploying working services for their existing data and local situations.

The OGC members that are acting as initiators of the Soil Data Interoperability Experiment are:

- **CSIRO** (Commonwealth Scientific and Industrial Research Organisation), Australia
- **Landcare Research** New Zealand Ltd.
- **ISRIC** - World Soil Information, Netherlands

All three organizations are members of WGSIS.

A summary of the activity plan, requirements for participation, schedule, and kick-off meeting details are available at: https://portal.opengeospatial.org/files/?artifact_id=63190&version=1. The Initiative Manager is David Medyckyj-Scott. Contact details are included in the activity plan.

The OGC® is an international geospatial standards consortium of more than 500 companies, government agencies, research organizations, and universities participating in a consensus process to develop publicly available standards. OGC standards support interoperable solutions that 'geo-enable' the Web, wireless and location-based services, and mainstream IT. Visit the OGC website at <http://www.opengeospatial.org/contact>.

GSP Call for experts to serve on the Intergovernmental Technical Panel of Soils

The Global Soil Partnership (GSP) has invited all its Partners to nominate soil experts from their regions as candidates for appointment to the Intergovernmental Technical Panel of Soils. Nominations were to be sent to the GSP-Secretariat@fao.org on or before 20 May 2015.

2015 International Year of Soils



2015 is the International Year of Soils. The IUSS and with it, many cooperating organizations are celebrating the year in a big way. IUSS has made a list of meetings and conferences that have been planned by the national soil science societies and this list can be downloaded from the IUSS website http://www.iuss.org/index.php?article_id=25

IUSS Statement for the Celebration of the UN World Soil Day in Rome and New York, Dec. 5, 2014

Excellencies, Presidents, Distinguished Guests, Ladies and Gentlemen!

On behalf of the International Union of Soil Sciences, I have the privilege and honour to convey the best greetings of more than 60,000 soil scientists from around the world to you, on the occasion of the World Soil Day celebration by the U.N./FAO in Rome and New York. The World Soil Day (WSD) was initiated by the Council of IUSS in August 2002 during the 17th World Congress of Soil Science, which was opened by her Highness Princess of Thailand. The decision was taken by the council members, who defined the 5th of December, which is the birthday of his Majesty King Bumibhol Adulyadej of Thailand, as the 'International Day of the Soil'. Therefore, for the last 10 years, the WSD has been commemorated by numerous national soil science societies all over the world, thus initiating the celebration of the Soil of the Year as a continuous annual event in order to enhance awareness of the beauties, the potential, and the vulnerability of the world soils. After an audience of 3 IUSS representatives with his Majesty King Bumibhol of Thailand in April 2012 in Bangkok, the Government of Thailand submitted officially a proposal for the International Day of the Soil to the FAO Council for

support at the UN General Assembly in New York. In December 2013 the UN not only installed the WSD but also 2015 as the 'Year of the Soil'. From 2015 onwards, the WSD will be celebrated by the IUSS in close cooperation with UN /FAO, Global Soil Partnership (GSP) and other worldwide organisations.

This very positive and supportive link between the IUSS as a scientific organisation and various other international organisations (e.g., FAO and UN) allow to promote soil awareness and to foster the knowledge about soils as a non-renewable and very sensitive and fragile ecosystem. Therefore, soils must be used carefully and according to their resilience and elasticity for the long-term maintenance of key properties and processes, thus meeting the demands of the growing world population. Through land misuse and soil mismanagement, soils have been increasingly degraded and some were irreversibly lost. Therefore, we have to make clear, that just public concern is not sufficient to protect soils and to use them sustainably. We need to take action! The strategy is to reach sustainable intensification for achieving food security, sufficient drinking water supply, and the reduction of greenhouse gas emissions. This means the mitigation of global change processes for maintaining healthy soils. Therefore, it is essential for scientists and the interested community to know more about soils and their functions. Additionally it is important to convince politicians, decision makers, landowners, and the world community about the importance of soils for the provision of goods and services for humankind.

It has been more than 500 years ago the famous artist and scientist Leonardo Da Vinci pointed out that "we know more about celestial bodies than about soils underfoot". As is indicated by the celebrations of the WSD today soils should receive the importance which they rightfully deserve. They should be placed at the forefront of the scientific agenda, on the roster of policy makers, and in the awareness of the general public. Soils, as we know, are the most complex biomaterials on the planet and are a self-regulating biological factory. Thus, it is absolutely essential that soil degradation, as the



most insidious and underestimated challenge of the 21st century, must be defeated. At present, the vulnerability of soils because of global change and under anthropogenic impacts is unprecedented. Severe degradation, including widespread contamination, accelerated erosion, severe depletion of carbon and nutrients, rapid urbanization, and frequent hazards are threatening sustainable food production, adequate water supply, global ecosystem services, and the quality of human life. Soil carbon sequestration, soil restoration, the conservation of biodiversity and other important soil functions are important for the sustainable land and soil use.

The IUSS will cooperate with UN and other organisations to improve the scientific knowledge and to promote the global acceptance of soils as one of the most important natural resources. The IUSS will also strengthen the awareness concerning the vulnerability of soils to abiotic and biotic stresses and the limitation of diverse land use approaches. As the world's leading soil sciences union and member of ICSU, IUSS in cooperation with FAO, UN and other organisations, IUSS has the capacity and the responsibility to jointly undertake initiatives to improve the visibility of soil related issues to the public at large. It should also convince landowners, farmers, foresters and the policy makers to observe soil properties and functions as well as their threats and limits. On this auspicious occasion of the WSD, IUSS as the founding organisation of the WSD in 2002, congratulates the FAO and the UN for celebrating the World Soil Day together with the launch of the International Year of Soils 2015.

Finally, I express my sincere wishes for a strong cooperation between IUSS and UN/FAO. Together we can enlarge the scientific knowledge, strengthen the understanding of the soil as a finite and non-renewable resource, promote the sustainable use of soils, and enhance awareness about the importance of soils for the production of food, adaptation and mitigation of climate change, and the provision of water. Soil is the basis of all terrestrial and aquatic life. It must be used, restored and improved for human wellbeing and nature conservation.

Happy World Soil Day!

*Prof. Prof. h.c. Dr. Dr. h.c. Rainer Horn (President),
Prof. Dr. Rattan Lal (President elect), Prof. Dr. Jae
Yang (Past President)*

Activities of IUSS Divisions and Commissions for IYS

For the International Year of Soils the IUSS Divisions and Commissions decided to increasingly raise soil awareness. Each quarter contributions will be provided by a different division. Commissions of these divisions would provide knowledge on a special soil topic to inform about the importance and diversity of soil.

Division 1, Commission 1.3 Soil Genesis

By Prof. Emer. Dr. Kazutake Kyma, IUSS Honorary Member, and Dr. Teruo Higashi, chair of Commission 1.3: Soil Genesis, with Japanese Society of Pedology (President, Prof. K. Sakurai)

The **Annual Meeting and 'IYS 2015 and beyond' Symposium** was held at Tokyo Campus, University of Tsukuba, Japan, on March 21, 2015. Prof Emer IUSS honorary member, K Kyuma presented the history of Japanese Soil Science and Pedology, Prof Nagatsuka spoke about WRB (World Reference Base) and the Japanese soil taxonomy, Dr Anzai about pedology and agricultural production, and Dr Hakamata about soil and culture. Many insights were obtained. <http://pedology.ac.affrc.go.jp/>

Division 2, Commission 2.3 Soil Biology

Second International Conference entitled 'Ecology of Soil Microorganisms', Prague, Czech Republic November 29 - December 3, 2015.

We are pleased to welcome you to the second conference on the Ecology of Soil Microorganisms to be held in November/December 2015 in Prague, another conference on this topic after the first one organised in 2011 that was attended by more than 400 participants from all over the world.

The conference is planned as an interdisciplinary platform that offers 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 hope to link the modern 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 proto-

zoa. We also cordially invite presenters from the emerging fields of ancient DNA and archaeomicrobiology.

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.

Information and contact: <http://www.soilmicrobes.org> and info@soilmicrobes.org, baldrian@biomed.cas.cz.

Division 2, Commission 2.4 Soil mineralogy

By Balwant Singh Chair, and Steve Hillier Vice-Chair

'Euroclay 2015' in Edinburgh University, July 5-10, 2015

Clays in the Critical Zone: soils, weathering and elemental cycling

The 'Critical zone' or CZ includes the porous places extending from treetops to the bedrock, and more especially soils where organisms interact and shape the Earth's surface over timescales from seconds to eons. Clay minerals and finely divided oxides are significant players within the CZ. In particular, they are known to be key in the fate of elements (both nutrients - including carbon - and pollutants) and molecules (e.g. pesticides but also drugs such as antibiotics). This session seeks contributions regarding chemical and structural characterization of clay sorption properties, sorption mechanisms of these species on clays, and structural modifications induced by the interactions of clays with these elements and molecules. The session will also welcome contributions that examine, at a more global scale, clays and their role in life-sustaining matters, such as water quality, land use, carbon cycling, soil quality, contaminant transport, weathering and climate change. In essence, 'How do clays help us to understand CZ functions and how will the CZ change into the future?'

Convenors: Paul A. Schroeder and Jason Austin, University of Georgia; Bruno Lanson, University of Grenoble; Steve A Banwart University of Sheffield

Joint Contribution of Division 2, Soil Biology Commission and Division 3, Paddy Soil Working Group

By Division 2, Soil Biology Commission vice chair Dr Susumu Asakawa, and Division 3 Paddy Soil Working Group chair Dr Mizuhiko Nishida (joint)

A joint symposium entitled **'Research frontiers on microbiological and biochemical processes in paddy soil'**, September 18-21, 2015 at the 12th In-

ternational Conference on The East and Southeast Asia Federation of Soil Science Societies (ESAFS) in Nanjing, China; <http://esafs2015.csp.escience.cn/dct/page/1>

Rice cultivation in flooded paddy fields is a good and important system of crop production in the monsoon area of Asian countries. In this symposium, recent topics about latest studies on microbiology and biochemistry of paddy soil will be discussed, including environmental issues, nutrient cycling and soil fertility, for the better understanding of the microbiological and biochemical processes in paddy soil.

Commission 2.5 Soil chemical, physical and biological interfacial reactions

Soil interfaces for sustainable development

7th ISMOM, 4th InterCongress Conference of Commission 2.5, held jointly with the annual meetings of the Canadian and Quebec societies of Soil Science. McGill University, Montréal, Québec, Canada, July 5-10, 2015.

As ever this will be a multidisciplinary meeting attracting participants from all over the world working on many aspects of interactions in soils, including innovative methodology, and the consequences for soil quality and the dynamics of nutrients and pollutants. There will be five sessions (i) Macro and micronutrient dynamics in soil; (ii) Dynamics of pollutants in soil; (iii) Soil microbiology; (iv) Organo-mineral interactions in soil; (v) Analytical and methodological advances in soil study. Keynote talks will be given by John Duxbury (Integrative Plant Science, Cornell, USA), Stephan Kraemer (Environmental Geosciences, Vienna, Austria), Beverly Hale (Environmental Sciences, Guelph, Canada), Kornelia Smalla (Epidemiology and Pathogen Diagnostics, Julius Kuhn Institut, Germany), Claire Chenu (Ecology & Environmental Sciences, Paris, France) and Peter Leinweber (Soil Science, Rostock, Germany). Registration fees are low and good-value accommodation is ensured.

We are also pleased to announce the **first PM Huang award** for the time in memory of that eminent scientist, first Chair of the Commission and organiser of the first ISMOM, held in Edmonton, Canada in 1992. Benny K.G. Theng will give a Pre-Symposium Short-Course on 'The chemistry of Clay-Polymer Reactions' July 4- 5, 2015.

<http://ismom2015.conference.mcgill.ca/index0f50.html>

Division 3, Commission 3.3 Soil fertility and plant nutrition

By Prof. Dr. Takashi Kosaki, Division 3 chair, and Dr. Toru Fujiwara, vice chair of Commission 3.3 Soil fertility and plant nutrition

13th International Conference on the Biogeochemistry of Trace Element (ICOBTE), Fukuoka, Japan, July 12-16, 2015;

ICOBTE 2015 will include special sessions on trace element issues of particular relevance to Japan, including mercury and radioactive element contaminations. Many people are familiar with the Japanese history of mercury contamination and Minamata disease. The city of Minamata is located only 90 min (by train) from the conference centre and today Minamata is a model city of environmental and sustainable rejuvenation. After tragic earth quake and tsunami, a wide area of northern Japan was contaminated by radioactive contaminants from the nuclear accident at the Fukushima Daiichi nuclear power plant. ICOBTE 2015 will also include a special session on radioactive element contamination.

<http://www.icobte2015.org/index.html>

Activities of IUSS Working Groups for IYS

Working Group World Reference Base for Soil Resources (WRB)

The Working Group is the editor of the WRB – International soil classification system for naming soils and creating legends for soil maps. Testing and further developing the WRB is a continuous task. Discussions, meetings and field trips are therefore essential. The third edition of the WRB was published in 2014 as FAO World Soil Resources Report No. 106 and is the currently valid system. It can be downloaded (as pdf and as an Android app) from: <http://www.fao.org/soils-portal/soil-survey/soil-classification/world-reference-base/en/>. The first edition of the WRB was published in 1998 and the second in 2006. The WRB is originally based on the Legend (1974) and the Revised Legend (1988) of the Soil Map of the World produced by the FAO and UNESCO (1971-1981).

The WRB field trip of 2015 will go to China (Inner Mongolia, Gansu, Qinghai, Tibet – sorry, it's already full).

Our discussions have two major topics:

- When we discuss a soil profile, we strictly apply the rules and definitions of the WRB and see if this results in an informative and satisfying soil name. If not, we have to discuss changes of the definitions or amendments to the soil name. An informative soil name must inform about the genesis and the functions of the soil. The continuum of the soilscape must be ordered into classes in a logical way.
- For map legends, generalization and ranking of properties is required. Do our rules allow the creation of informative names for soil map units? If not, we have to discuss changes to the rules for ranking and generalization.

Working Group on modelling of soil and landscape evolution

This WG aims to progress quantitative soil and landscape evolution modelling by bringing together people modelling at (2D- or 3D-) landscape scales and people modelling (1D-) pedons. According to a survey, landscape modellers need more detailed and mechanistic process descriptions while pedon-scale modellers need the incorporation of matter fluxes (3-D) at the landscape scale in their models. We perceive that the cooperation of scientists active in landscape- and pedon scale modelling, paleopedology and pedometrics will be needed to bridge this gap.

The Working Group aims at establishing a platform where soil and landscape modellers can meet physically and virtually. Physical meetings are organized in the form of symposia in larger conferences such as EGU, AGU, Eurosoil, Pedometrics, etc. and in the form of workshops containing model demonstrations. A website (<http://soillandscape.org>) and an annual newsletter are established to stimulate interactions. To identify main development issues in soilscape modelling a review paper has been written and discussion sessions are planned in workshops. The ambition is to have, at the end of the 4-year period of the working group, a community interacting on the topic of soilscape modelling that is producing, testing and evaluating models.

Activities in 2015:

- Launch of <http://soillandscape.org>
- A first edition of the annual newsletter (early March 2015)
- Co-organisation of a workshop at EGU (April 12-17, 2015: Linking evolution of landscapes, soils and biogeochemical cycles through models, novel approaches and soil records)
- Organization of a 1-day workshop (September 14, 2015) during Pedometrics 2015 (Cordoba, Spain, September 14-18, 2015)

Soil message (something completely different)

Interact with soils and ask yourself: What crop would grow in the soils of your backyard and how long could your backyard sustain your family?

Cryosol Working Group

The Cryosol Working Group (CWG) is a community of researchers studying soils underlain by permafrost in cold environments of both polar regions and high mountains. Possible presence of ground ice, permanent subzero temperatures at some depth, and seasonal freezing–thawing cycles in the soil body contribute to the specific features of the functioning and morphology of these soils that cannot be understood without due consideration for the diverse cryogenic phenomena. Cryosols store up to 50% of the world soil organic carbon pool and are highly sensitive to global climate change.

Activities:

The key aim of the CWG is to facilitate communication between cryosol researchers via meetings, and to encourage other collaborative activities. Ongoing field projects contributed to by our members include: the circumpolar active-layer monitor-

ing project (CALM) and studying and modeling soil and permafrost temperature conditions, greenhouse gas fluxes, distribution of organic carbon in soil and deep frozen subsoil layers, search for the most ancient permafrost preserving viable biota of the past, metagenomics of Cryosols, surface stability and geomorphic processes in Cryosol areas, indigenous and modern approaches to the management and conservation of Cryosols, specific features of hydrological cycle in these soils, and many other 'hot issues' in Cryosol research.

The Soils of Antarctica monograph edited by J. Bockheim, and published by Springer is currently in press and should be available soon.

An illustrated Cryosol Calendar 2015 has been prepared by the CWG to celebrate International Year of Soils. A pdf can be downloaded at https://drive.google.com/file/d/0B-X3_12d8IM4cTNiMGNNcGdtbXc/view?usp=sharing_eid

Conferences/meetings:

- International conference Genesis, Geography and Ecology of Soils in Cold Regions, Ulan-Ude (Buryat Republic, Russia), August 31-September 9 2015 (with pre-and post-conference tours to Transbaikalian steppes, Lake Baikal, and East Sayan Mountains);
- International conference Permafrost in XXI Century: Basic and Applied Researches, Pushchino (Russia), September 27-October 1, 2015 with a special session devoted to Cryosols.
- The 11th International Conference on Permafrost in Potsdam, Germany (June 20-24, 2016).
- We hope to hold the 7th International Conference on Cryopedology – yet to be organized, possibly in Canada, in 2017.
- Cryosol session at IUSS Meeting in Brazil in 2018.

Soils of cold environments with permafrost and ground ice are particularly sensitive to global changes. Occupying about 13% of terrestrial surface, they store up to 50% of the world soil organic carbon pool and play an important role in the global carbon cycle. In-depth study of Cryosols and their biota may offer the key to the mechanisms of the long-term survival of life under harsh conditions and give us hints on security of interplanetary voyages and on the very first stages of biotic colonization of lifeless substrates! Cryosol environments are highly diverse: from virtually lifeless severe rocky and ice-covered deserts to immense boggy polygonal tundra with ice wedges and more

hospitable and productive taiga and steppes. Cryosols are dynamic soils requiring special care in our dramatically dynamic world. It is probable that the extent of Cryosols narrows on a warmer planet, whereas the range of problems associated with these soils and their potential degradation and disappearance becomes wider. Cryosol Working Group is in search for broadening its horizons!

Russia is known for its by far the largest permafrost area, so it is not surprising that Russia hosts many events related to Cryosol research. Two important conferences are planned for 2015: an International Conference on the Genesis, Geography and Ecology of Soils in Cold Regions devoted to the centennial anniversary of the birth of one of the founders of Russian cryopedology O.V. Makeev and a traditional international conference on permafrost research in Pushchino.

Universal Soil Classification System Working Group

The International Union of Soil Sciences Working Group for Universal Soil Classification System (USCS) was officially established by an IUSS Council decision in August of 2010 at the World Congress of Soil Science in Brisbane, Australia and renewed in June of 2014 at the World Congress of Soil Science in Jeju, South Korea. The charge for the Working Group includes development of common standards, methods and terminology in soil observations and investigations and the development of a universal soil classification system.

Activities of the Universal Soil Classification System Working Group:

The USCS working group is organized and composed of representatives from countries from all continents with currently applied classifications systems along with representatives from relevant organizations.

The working group has devised a framework of task groups and priorities that were built for moving forward with the effort to provide harmonized criteria for describing and analyzing soil and work needed to understand gaps in existing soil classification and researching the potential for an overarching soil classification system that can be accepted globally, is based on available data, utilizes new technologies, can easily facilitate the use of new data and can position Soil Science discipline to react to the vast amounts of data (high resolution raster information systems) that is currently being produced and how soil classification can be

applied to this new data model of information. The framework is built into 3 distinct categories

1. Soil Classification Issues
2. Diagnostic and Soil Profile Information Harmonization
3. Important Information relating to Soil Classification

Key areas of progress from the above categories are the following:

- Cold Soil Group -elaboration the classification system for cold (not only permafrost-affected) soils
- Tropical Soils – Define diagnostics and major properties for soils that are developed in the tropical regions
- Development of a data centroid approach to soil classification
- Evaluation of diagnostic criteria from existing soil classification systems
- Compare guidelines for field profile descriptions (redox, structure, color, consistency, texture, etc.)
- Compare and compile horizon nomenclature, designations, definitions
- Development of a horizon classification system – Research and develop a process that will provide categorization of soil characterization data into logical groupings for surface horizons
- Moisture and Temperature Regimes – Define potentials for the development of soil moisture and temperature regimes world

Meetings of the Universal Soil Classification Working Group

- Full meeting of the working group-June 14, 2014, Jeju, South Korea
- Partial working group meeting, November, 2014, in conjunction with the Soil Science Society of America meeting in Long Beach, CA
- Partial working group meeting, November, 2014, in conjunction with the 20th Latin America Soil Congress, Cuzco, Peru
- Full meeting of the working group, June, 2015 in conjunction with the IUSS Digital Soil Morphometric conference, Madison, WI

Universal Soil Classification

As the Working Group has deliberated options for the future of a universal soil classification system, a data centroid-based approach is being seriously researched. This involves analyzing databases to make allocations of soil properties into logical clouds designed to recognize 'Great Soil Groups'. The Great Soil Groups will be equivalent to the great group level from U.S. Soil Taxonomy, along with similar levels in

the World Reference Base, Australian Soil Classification, and other defined soil classification systems. The Great Soil Groups will have taxa developed that will document more and less detail. Lower taxa in the system will potentially recognize anthropogenic features, family criteria, climate and other important use and management characteristics. Higher taxa in the system can be developed for meso- and macroscale applications. As more data are added to the system, taxonomic distance calculations can be used to determine if new categories are needed based on tolerances that are set. This system can then be more scalable based on the objective analyses of the data that are collected and entered into the system.

Working Group Acid Sulfate Soils

The International Union of Soil Sciences' Working Group Acid Sulfate Soils serves to promote acid sulfate soil science and management. Acid sulfate soils are located on all continents and if mismanaged can cause severe environmental degradation.

Activities of the Acid Sulfate Soils Working Group: The Acid Sulfate Soils Working Group has had long and active service in promoting acid sulfate soil science and management. For example, building on the first International conference on acid sulfate soils in Wageningen held in 1972, the past three International Acid Sulfate Soil Conferences (held in Australia 2002, China 2008 and Finland 2012) have all attracted well over 100 attendees from around the globe.

The 7th International Acid Sulfate Soil Conference held in Vasa, Finland featured a pre-conference tour, three days of oral sessions, including a half-day public session, and poster session, a mid-conference tour, a conference dinner, and two post-conference one-day field trips.

The upcoming 8th International Acid Sulfate Soil Conference will be held at College Park, Maryland, USA, July 17-23, 2016. This conference will provide a forum for the exchange ideas regarding the origins, properties, management, classification and reclamation of acid sulfate soils. It will also include components for the education of those less familiar with acid sulfate soil issues and problems. Three days will be designated for oral and poster presentations (July 18,19 and 21). Additionally, 2-3 field tours are planned throughout the week. Further information on this conference can be found at <http://www.midatlanticsoilscientists.org/acid-sulfate-soils-conference>.

Activities of National Soil Science Societies for IYS

Celebration of the International Year of Soils in Costa Rica

Activities in Costa Rica promoted by the Costa Rican Soil Science Society to celebrate the International Year of Soils in the first four months of the year can be summarized as follows:

CONCOURSE

We began with a 'Concourse of photography' called 'Soils of my country', in which young people aged 13 to 18 years participated. The following pictures were awarded: see below.

CONGRESS

March 18-20 the VIII National Congress of Soil was held with the participation of 250 professionals. The objective was to recognize the integral behaviour of soils through their 7 functions under the slogan 'Soils, a solid foundation for life'. In addition to the 44 short oral presentations and 48 posters, presented for the first time in digital format, two other activities were carried out.



*Category A:
Sebastian
Cruz Céspedes
8th year Isaac
Martin High
School*



*Category B:
Ana Brenes
Cevallos 10th
year Calasanz
High School*



WATER

CARBON

BIODIVERSITY

RECYCLING

AGRIC PROD

URBANISM

HERITAGE

1-Key conferences for each function

Seven main speakers representing each of the soil functions were invited:

WATER -

Rainer Horn, President of IUSS, Germany
CAPTURE C and CLIMATE CHANGE -

Rattan Lal, President-elect of IUSS, Ohio, USA
BIODIVERSITY -

Diana Wall, Global Soil Biodiversity
Coordinator, Colorado, USA

RECYCLING -

Flavio Camargo, Vice President IUSS, Brazil
AGRICULTURAL PRODUCTION -

Gonzalo Farias, President of the SBCS, Brazil
INFRASTRUCTURE AND PLANNING -

Luis Guillermo Loria, Lanname, Costa Rica
CULTURAL HERITAGE -

Ricardo Vásquez, National Museum, Costa Rica

2-Panel ‘The land use in Costa Rica’

The panel put on the table how the different activities are competing for the use of the same territory. The Minister of Agriculture, Dr. Luis Felipe Arauz as representative of Agricultural Production, the President of Acueductos y Alcantarillados, Dra. Yamileth Astorga for water, Dr. Luis Guillermo Loria from Lanname for infrastructure, Mr. Eduardo Brenes for urbanism and Ing.Agr. Renato Jiménez, as a defender of Soil Conservation, discussed the options to promote proper coexistence of all those soil functions in a defined territory.



Declaración de San José

In April 2012 all Latin American countries under the XIX Latin American Congress of Soil Science, declare the Latin American soils "common goods of all nations of the continent."

Today, 18 March 2015, in the International Year of Soils, those here present, representatives of the world soils authorities and Costa Rican government authorities, We affirm to the entire country and neighbor countries and recognize:

- The fundamental role of soils on human life in terms of the production of food, fiber and energy
- Its priority participation in the collection, purification and storage of water
- Its unquestionable role in terrestrial ecosystems by participating in carbon capture, recycling and maintaining a rich biodiversity of organisms, making it subject to unavoidable quantization in ecosystem services
- Its relationships with urban planning, road infrastructure and preservation of our cultural heritage
- That the soil is a finite and fragile natural resource that is under an accelerated process of deterioration due to improper handling and lack of protection
- The need for perception of the entire population of Costa Rica in relation to the solid foundation that soil has for survival of life on the planet

And we are committed to:

- Be active and proactive part of international efforts promoted by the World Alliance for Soil (FAO-UN) to protect soil resources for future generations
- Promote land use and the coexistence of all soil functions
- Include the knowledge of soil and its functions in national education programs
- Ensuring rational use of resources
- Promote strategies for the conservation and sustainable use of soil
- Incorporate integrated management of soil resources within the concept of sustainability that runs the country, in terms of programs and budgets
- Valuing ecosystem goods and services that soil provides to the sustainable development

Signers of the Declaration

Ministry of Agriculture and Livestock of Costa Rica
Deputy Minister of Environment, Energy and Sea of Costa Rica
Academic Deputy Minister of Education of Costa Rica
President and Vice President of the International Union of Soil Science
Scientific Director of Global Soil Biodiversity Initiative
President of the Brazilian Society of Soil Science
Secretary of the Latin American Society of Soil Science
Representative of the World Alliance for Land-FAO for Central America, Mexico and Caribbean
ITPS Latin American representative of the Technical Panel
FAO representative in Costa Rica
Board of the Costa Rican Association of Soil Science

DECLARATION OF SAN JOSE

The signing of the 'Declaration of San Jose' between government officials who attended the event together with soil authorities and international visitors is considered a great achievement. The manifest establishes the role of soil in the survival of life on the planet, and the commitment of all to promote the conservation of soils for future generations.

The Egyptian Soil Science Society (ESSS) and the International Year of Soils 2015

Concerning the International Year of Soils (2015), the ESSS has initiated some activities starting with a symposium held at Cairo Uni. on December 8, 2014, and a conference held at Zagazig Uni. 15-16 December 2014. In addition, a symposium was held in Kafrelsheikh Uni. in May 2015. The activities will end with the ESSS symposium in October 2015, which will include the following lectures:

1. Abuses or attack on the Agricultural Soils
2. Degradation of the Agricultural Soils
3. Environmental Pollution
4. Water Harvesting
5. Biofortification, Soils and Human Health
6. Soil Security
7. Desertification
8. Egyptian Agricultural Investment in the Basin Nile Countries
9. Blast-locked soil in the western-northern coast of Egypt, to when?

Item or topic	Time
Registration	9:00-10:00
1st Lecture: Abuses or attack on the Agricultural Soils	10:00-10:30
2nd Lecture: Degradation of the Agricultural Soils	10:30-11:00
3rd Lecture: Environmental Pollution	11:00-11:30
4th Lecture: Water Harvesting	11:30-12:00
Break	12:00-12:30
5th Lecture: Biofortification, Soils and Human Health	12:30-13:00
6th Lecture: Soil Security	13:00-13:30
7th Lecture: Desertification	13:30-14:00
8th Lecture: Egyptian Agricultural Investment in the Basin Nile Countries	14:00-14:30
9th Lecture: Blast-locked soil in the western-northern coast of Egypt, to when?	14:30-15:00
Recommendations	15:00-15:30
Lunch	15:30-16:30

The International Year of Soils (2015)

**Symposium of ESSS on
The International Year of Soils
12 October 2015, SWERI,
ARC, Giza, Egypt**

<http://organicconnectmag.com/in-soil-we-trust/>



Participants at the Meeting (15.12.2014) celebrating World Day of Soil at Zagazig Uni. (Egypt)

The ESSS Symposium on the International Year of Soils will be jointly organized with the Soil, Water & Environment Research Institute (SWERI) and the Agricultural Research Center (ARC). The symposium will take place under the auspices of IUSS at SWERI, ARC, Giza, Egypt on 12 October 2015.

Italian Society of Soil Science (SISS) - Società Italiana della Scienza del Suolo

The Italian Society of Soil Science (SISS – Società Italiana della Scienza del Suolo) aims to promote progress, coordination and dissemination of Soil Science in a wider sense and to foster relations and cooperation between researchers, educators, stakeholders, land managers and policymakers involved in soil science and soil management.

The society is active through its four divisions:

- Division I: Soil in Space and Time;
- Division II: Soil Properties and Processes;
- Division III: Soil Use and Management;
- Division IV: The Role of Soils in Sustaining Society and the Environment

Soil is more than just the dirt under our feet!

Today more than ever before, maintaining soil quality is a critical goal of any sustainable development. In fact, productive soils sustain human life and all organisms in the environment. The quality and safety of crops and derived products depend mainly on the quality and safety of the soils. Starting from these considerations the Italian Society of Soil Science (SISS) will organise its 40th National Congress as food for thought on the importance of soil quality for human health. The leitmotif of the congress will be 'Healthy Soils for Healthy Life', the same as FAO's leitmotif to celebrate 2015 as the International Year of Soils.

During the Congress there will be a 'World Soil Day' Celebration Party, to stress the importance of

soils in feeding humankind and their fundamental role in environmental equilibria; the 'G. P. Ballatore' award for the best thesis on Soil Science for graduated students in Italy in 2013-2014; a Photo Contest on 'Soil is my best friend!'; two *Lectio Magistralis* held by outstanding soil scientists and four scientific sessions with oral and poster presentations.

The 40th National Congress of the Italian Society of Soil Science will take place in Rome, December 2-4 2015. It will be jointly organised by the Italian Council for Agricultural Research and Economics (CRA) and by the University of Palermo.

Soil message

Modern humans rarely reflect on the fact that both the well-being and the quality of life are fundamentally linked to the quality of the soils. The quality of human life depends indeed on the soil's health, on which we live carrying out any activity. Thus maintaining healthy soils and the quality of soil productions is the real target of any kind of sustainable development.

Soils are a Man's best friend!!

Japanese Society of Soil Science and Plant Nutrition (JSSSPN)

By Kazuyuki INUBUSHI, Division 2 chair of IUSS, working also with the Japanese Society of Soil Science and Plant Nutrition (JSSSPN, established in 1927), as Editor-in-Chief of Soil Science and Plant Nutrition (IUSS cooperating journal) as well as Chair of Kanto block of JSSSPN (see below)

Since December 2014, our Society (JSSSPN) has launched several activities for the International Year of Soils 2015.

On the regional level, the biggest branch of JSSSPN - the Kanto block (with Tokyo Metropolitan, Kanagawa, Chiba, Saitama, Ibaraki, Tochigi, Gunma, Yamanashi, Nagano and Niigata Prefectures) held its annual meeting (Yamanashi University, Kofu, December 6, 2014) and a symposium on local and global issues related to soil science. A special lecture was delivered by the President of JSSSPN, Prof Takashi Kosaki, on how we should act in the International Year of Soils. Other branches also celebrated the kick-off of IYS in December 2014.

On the national level, a Special Open Forum dedicated to the Celebration of the International Year of Soils 2015 was held in Ueno National Science

Museum in Tokyo, December 5-7, 2014, including an exhibition of soil monolith profiles from north to south.

Prof Takashi KOSAKI, President of JSSPN and IUSS Division 3 chair, presented a Map of World Soil Resources and emphasized how diverse world soil is; soil scientists work hard to maintain and strengthen the multi-functions of soil. Organic farmer followed to tell his experiences how soil reacts with his production. Prof Katsuyuki MINAMI presented how soil science developed historically and now interacted with global environment and human health.

<http://www.kahaku.go.jp/news/2014/12soils/>

<http://jsspnkanto.web.fc2.com/>

(in Japanese only)

Annual meeting of Japanese Society of Soil Microbiology (JSSM) and Open Special Forum on the occasion of International Year of Soil 'Soil Microorganisms for Life', May 22-23, 2015 at Tsukuba Epochal in Tsukuba, Japan

JSSM was founded in 1954 in Japan to promote investigations of Soil Microbiology under mutual cooperation between the scientists. We aim to increase agricultural production and environmental conservation through our activity. In the Open Special Forum, we will present how soil microorganism important for life to create soil and keep harmony with the environment.

<http://jssm.sakura.ne.jp/JSSM-E.html>

The Soil Science Society of Nigeria (SSSN)

The Soil Science Society of Nigeria (SSSN) is a registered member of the International Union of Soil Science. Our mission is "to advance the study of soil, promoting and fostering understanding of basic and applied Soil Science, nationally and internationally". The Society also strives to enhance the dissemination of knowledge in all aspects of Soil Science and shares ideas with national and international societies through conferences, symposia, lectures, seminars and journal publications.

The Soil Science Society of Nigeria in partnership with the Food and Agriculture Organization of the United Nations and the International Union of Soil Sciences will organize a number of events throughout 2015 to celebrate the International Year of Soils in Nigeria.

The flagship event was the **39th Annual Conference of the Soil Science Society of Nigeria** held in Omu-aran, Kwara State, Nigeria, March 9-13, 2015.

The theme of the Conference '*Managing Nigerian Soils for Food and Nutrition Security and Climate Change Adaptation and Mitigation*' was chosen to discuss contemporary issues as they relate to the effect of climate change on food and nutrition security, as well as on adaptation and mitigation measures. It was also envisaged that the Conference would provide a forum for Nigerian Soil Scientists, interested stakeholders and policy makers to discuss the concept and operationalization of Global Soil Partnership in Nigeria as well as launch the 2015 International Year of Soils. For details on the event the reader is kindly referred to the section Conference / Meeting reports.

Further activities of the Nigerian Soil Science Society to celebrate IYS will include the publication of **leaflets** describing the importance of soils and their utilization, especially in the context of agriculture and the need for their sustainable management. The leaflet will specifically describe the situation of Nigeria. These leaflets will be distributed to participants at the conference and at major gatherings throughout the year.

Decision makers (Members of Parliament) are engaged to increase their awareness on soil matters. A **one day awareness workshop for decision and policy makers** (Members of Parliament, Ministers of Agriculture, Environment, Science and Technology and Water Resources) and selected stakeholders will be organized in Abuja on 17 August, 2015. The objective of the event is to seek the commitment and strong political support of decision and policy makers, to make all stakeholders aware of the importance of soils in the attainment of food and nutrition security as well as the need for their sustainable management. Papers will be presented on the listed topics by resource persons to be identified by the SSSN Executive Committee.

Workshop Topics for Decision Makers:

- Soil Resources of Nigeria
- Threats to Soil Security
- Concept of Soil Security
- The role of soils in ecosystem processes
- Soil Policy Development in Nigeria

Participants: 100 participants from the National Assembly, Ministries of Agriculture, Environment,



Education, Science and Technology and Water Resources. Selected stakeholders will be invited from farmer associations, industry and development partners.

Another planned activity is the dissemination of **Soil information and soil knowledge to young people** through **one-day seminars** which will be organized for young people in one location in each of the six geo-political zones as follows:

- North Central -> Minna
- North West -> Zaria
- North East -> Bauchi
- South East -> Nsukka
- South South -> Calabar
- South West -> Ibadan

The topics to be covered include Soil Resources of each of the Geo-political zones as appropriate; Soils and their uses especially in Agriculture; Challenges of Soil Management; Career in Soil Science; Video presentation on different aspects of Soil Management; Tour of exhibition stands: Display of Soil Monolith, Display of Soil Maps, Display of science equipment for soil analysis.

The seminars will be organised October through to November 2015 (one day each in the six geopolitical zones).

Soil message from the Nigerian Soil Science Society

The importance of soil is enormous. Soil acts as a water filter and a growth medium; provides habitat for billions of organisms; contributes to biodiversity and supplies most of the antibiotics used to fight diseases. Humans use soil as a holding facility for solid waste, filter for wastewater, and foundation for buildings and structure. More so, soil is the basis of our nation's agro-ecosystems which provide us with feed, fiber, food and fuel.

The Soil Science Society of Nigeria wishes to remind us all that soil resources are finite and thus should be treated as such. Every human being that wishes to live in a safe, clean, poverty free and food abundant earth should not abuse the soil. The lives of our children and great grand children depend on our sustainable use of today's soil.

IYS Conference and Meeting reports

Soil and Water Networking National Workshop, January 4-7, 2015, IIT, Kharagpur, India

Celebrating the International Year of Soils with a National Scientific Networking workshop in India

A Soil and Water National Networking Workshop was held at IIT, Kharagpur, India, January 4-8, 2015, sponsored by the Australia-India council, and organized jointly by the University of Sydney and the Indian Institute of Technology. This workshop coincided with the declaration of the year 2015 as the International Year of Soils by the 68th UN General Assembly and may be the 'very first celebration' of this important declaration around the world. The workshop participants deliberated on the challenges and opportunities that digital soil mapping creates for sustainable management of soil resources. Further, discussed was a road map to build an IndianSoilMap that can seamlessly integrate with the GlobalSoilMap.net project.

The National Soil and Water Networking Workshop was a success; the Indian scientists show-

cased high quality research and are keen to collaborate in the GlobalSoilMap effort. The workshop kicked off with a welcome video by Professor Alex McBratney (Dokuchaev award winner in Soil Science), and soon the podium was taken over by Australian and Indian scientists to showcase high quality research. The workshop invited and brought together 40 scientists from several distinguished institutes, namely, ICRISAT, ICAR, IARI, CSIR, CSSRI, NIT. Prof. Budiman Minasny, as a keynote speaker, presented the importance and concept of soil security. Speaking at the workshop, the director of IIT Kharagpur and Prof. Bhabani Das urged a written agenda for joint collaboration between Indian and Australian counterparts on digital soil mapping contributing to soil security and sustainable productivity. In addition to this, the Assistant Director General of Indian Council of Agricultural Research (ICAR), Dr. S.K. Chaudhari, welcomed the GlobalSoilMap initiative and was keen on developing Indian collaboration in the Global Soil Map effort.

The participants at the workshop discussed several key issues including soil security, digital soil mapping, India's participation in the GlobalSoilMap, national level spectral libraries, soil data require-



The photo shows the Soil and Water Networking National Workshop participants with the Director of IIT, Kharagpur.



ment in crop simulations, and soil health mapping. Distinguished speakers emphasised the need to provide fine scale soil fertility information to policy makers and managers which can further be used by industry partners/farmers to plan future land use and management options.

This fits well with the requirement for India to participate in the GlobalSoilMap and push forward the concept of digital soil mapping. Digital soil mapping and spectroscopy techniques can accelerate the provision of fine scale information on soil fertility and conditions in India. It can also be used in monitoring and understanding soil nutrient change over time.

Kanika Singh

XVIII Dokuchaev's conference for young scientists 'Soil degradation and food security of Russia', March 2-5, 2015, St. Petersburg, Russia

Saint-Petersburg State University, Central Museum of Soil Science V.V. Dokuchaev of the Russian Academy, Dokuchaev Society of Soil Science and Fund for Retention and Development of the Scientific Heritage of V.V. Dokuchaev organized the International scientific conference XVIII Dokuchaev's conference for young scientists 'Soil degradation and food security of Russia' which took place March 2-5, 2015 in St. Petersburg, Russia. This conference was devoted to the International Year of Soils.

XVIII Dokuchaev's conference has been organized annually since 1998. Participants of the Dokuchaev's conference were schoolboys, students, post-graduate students and young scientists under 35 years old from Russia and other countries (Germany, France, Ukraine, Moldova, Iran, Azerbaijan, Kazakhstan, Uzbekistan). More than 250 participants submitted their papers in 2015 and about 120 participants came. Detailed information about the conference can be found at <http://soil.spbu.ru>.

The scientific conference was devoted to problems of food security of our country:

1. Forms of soil degradation and rehabilitation methods.
2. Agro-ecological potential of Russian soils.
3. Spatial and temporal aspects of the degraded soils study.
4. Study methods and assessment of the degraded soils.
5. Environmental regulation and legislation in the field of soil conservation.
6. Genesis, classification and mapping of soils.
7. School section 'The soil is a wet nurse'.

The opening of the conference took place on March 2, 2015 in the assembly hall of St. Petersburg State University where V.V. Dokuchaev founded soil science. Public authorities, various public organizations, scientists addressed the participants with a welcome speech.

Schoolchildren were active participants of the conference. A separate section was organized for them. Questions devoted to soil ecology, environmental and human problems were discussed.

Awarding ceremony for the winners of the trans-regional Olympiad for children and young people 'Soil and forest: relationship and interaction'



Plenary meeting in the hall of St. Petersburg State University



Schoolchildren were active participants of the conference.



Workshop

took place at the end of the official part of the conference. The Olympiad was devoted to the IYS.

Round-table discussions were carried out in Dokuchaev's Central Soil Museum. Discussions were organized as part of the XVIII Dokuchaev's conference for young scientists:

- “The role of young scientists in popularization of soil sciences in the International Year of Soils”
- “Integration of young Russian scientists into the international scientific community of soil scientists”.

Materials of the Dokuchaev's conference were published. All participants received memorable copyrighted badges.

Report of the 39th Annual Conference of the Soil Science Society of Nigeria and Celebration of the International Year of Soils (IYS) 2015 held at Landmark University, Omu – Aran, Kwara State, 9-13 March 2015

The 39th Annual Conference of the Soil Science Society of Nigeria was held at Landmark University, Omu – Aran, Kwara State, from 9th-13th March 2015. The theme of the Conference was **Managing Nigerian Soils for Food and Nutrition Security, Climate Change Adaptation and Mitigation**. The opening ceremony was chaired by the Chief Host and Vice-Chancellor, Landmark University, Professor Joseph O. Afolayan. The Dean, College of Agricultural Sciences, Dr G. O. Agbaje made an opening remark after which the Vice-Chancellor presented a welcome address. At the end of his address, the Vice-Chancellor, on behalf of the Chancellor of Landmark University, Dr David Oyedepo, formally declared the conference open. The President of the Soil Science Society of Nigeria, Professor V. O. Chude, after his address, flagged off the International Year of Soils (IYS) activities, while the Vice-Chancellor of Landmark University unveiled the logo of the IYS 2015. The ceremony also witnessed the investiture of nine deserving members of the Soil Science Society of Nigeria as fellows of the society.

The keynote address was presented by Professor G. O. Obigbesan of the Department of Agronomy, University of Ibadan, Ibadan, a fellow and life member of the Soil Science Society of Nigeria. Lead papers were presented by Dr Anthony Anuforom, the DG/CEO, Nigerian Meteorological Agency (NIMET), who was represented by Chief Godwin Ajaezi; Professor David N. Sasseville of Lincoln University, Missouri, USA; Mrs Ifeoma Anyanwu of the Federal Ministry of Agriculture and Rural Development; and Professor A. Chidilbe, FAS of the Department of Geology/INRES, University of Port Harcourt, Port Harcourt, who was represented by Dr Ferdinand Giadom. Goodwill messages were presented by Professor Julius Amioba Okojie, Executive Secretary, National Universities Commission (NUC) who was represented by Prof. Akaneren I. Essien while Mr. Richard O. Nzekwu presented on behalf of Mr. Chikelu Nwune, the National Project Coordinator, Nigeria Erosion and Watershed Management Project (NEWMAP). There were two video presentations by Profs Rainer Horn and Rattan Lal, President and President Elect respectively, of the International Union of Soil Sciences (IUSS).



Scientists examining physical quality of soil sample from "Eleyin Profile 1".

Over five hundred soil scientists, environmentalists, farmers, policy makers, the organised private sector and students attended the Conference. Participants discussed current soil-related challenges with particular emphasis on the management of the nation's soils for food and nutrition security, climate change adaptation and mitigation.

Over 400 papers in the areas of Soil Survey, Classification and Evaluation; Soil Conservation and Land Use Management; Soil Fertility and Fertilizer Management; Soil Chemistry, Microbiology and Biotechnology; and Soil Physics, Soil and Water Resources Management; and Climate Change were presented and discussed.

A field trip was undertaken to Landmark University Commercial Farms and Eleyin Plantation Farms. At the same time, there were workshops on Information and Communication Technology (ICT), Advances in Soil Fertility and Plant Nutrition, and Gender Mainstreaming in Agriculture.

OBSERVATIONS

Following the deliberations on the keynote address, lead papers as well as the presentations at the plenary and technical sessions and field trip, the Society:

1. Observes that land and soil degradation presents a serious threat to the overall attainment of the goal of the Agricultural Transformation Agenda (ATA) and the ultimate target of halving the number of hungry and poor people by the magic year 2015.
2. Appreciates that food and nutrition security is dependent on soil resources (soil, land and water), which are very vulnerable to Climate Change.



Group photo taken during the field trip.

3. Observes that in order to continue to feed the ever growing Nigerian population, there is an urgent need for effective soil management practices for optimal crop yields in all the agro-ecological zones of the country.
4. Notes that soil management strategies including general agricultural resilience, in particular, soil quality and resilience are key factors to Climate Change mitigation and adaptation in Nigeria.
5. Commends the Federal Government of Nigeria on the formulation and subsequent pursuit of the Agricultural Transformation Agenda and supports gender mainstreaming and equity in agriculture to realize its full potentials.
6. Notes that agriculture – based livelihood systems in Nigeria are very vulnerable to food insecurity especially in the low lying areas of coastal south-south; the flood prone areas of the south-west; the erosion prone areas of the south-east; the flood plain of the Niger-Benue trough, and the semi-arid/sahel drought/desertification prone areas of the north.

RESOLUTIONS

Given that the soil holds great potentials for resolving many of the World's economic and food production problems, and in consonance with the various programmes enunciated for marking the 2015 International Year of Soils (IYS 2015) as de-

clared by the United Nations, the Soil Science Society of Nigeria resolves as follows:

1. To celebrate the International Year of Soils 2015 in Nigeria in accordance with the MoU signed with the FAO Regional Office Accra, Ghana and with additional support from the International Union of Soil Sciences.
2. That all tiers of government in Nigeria should continue to support both quality assurance and quality control in the area of Agricultural Revolution, including the Agricultural Transformation Agenda of the Federal Government, and enticing young students to pursue careers in Soil Science.
3. Requests all land users to adopt policies and protocols including climate smart-agriculture aimed at halting and reversing all forms of land degradation.
4. Urges governments to upscale grass-root campaign on climate change and its consequences, preparatory to the adoption of mitigation measures.
5. Commends the Federal Ministry of Agriculture and Rural Development for Procuring 100 units of SoilDoc – a revolutionary technology for testing soil health for extension programme, which is a critical element of the Agricultural Transformation Agenda (ATA). This intervention is in tandem with soil extension activities of the Society.

The Society therefore welcomes the invitation of the Honourable Minister of Agriculture and Rural Development to participate in the implementation of the African Soil Information Service Phase 2 and the up-scaling of the SoilDoc projects in Nigeria.

6. Requests the three tiers of government to support all forms of gender mainstreaming in climate change and extension as well as in the generation of sex desegregated data on access to agricultural lands and input. There is also the need to enact policies that will protect small holder farmers who are predominantly women.
7. To support strategies for achieving agricultural resilience in Nigeria which requires innovative technologies, policies and programmes, provision of agro-meteorological services, early warning mechanisms for disasters, changes in agricultural practices, agricultural diversification, agricultural water management, risk management and agricultural insurance, secured land tenure rights, strategic financial market support, agricultural market development, and provision of extension services.
8. Commends the efforts of the National Assembly in the steps so far taken in the process for the approval of the Nigerian Institute of Soil Science (NISS) bill to regulate the practice of the profession of Soil Science and promote the efficient and sustainable management of Soils in Nigeria for Food Security, Climate Change, adaptation and mitigation.

APPRECIATION

The Society appreciates the generous support of the Chancellor, Landmark University, Omu-aran, National University Commission (NUC), the Food and Agriculture Organization (FAO) of the United Nations Regional Office, Accra, Ghana; Global Soil Partnership FAO Headquarters, Rome, International Fertilizer Development Centre, Nigeria, First Bank of Nigeria Plc, AgriGuardian Jefferson City, Missouri USA, Federal Colleges of Land Resources Owerri and Jos and good spirited individuals which made possible, the successful hosting of the 39th Annual Conference.

We also thank the Keynote Speakers and other lead speakers for honouring our invitation and doing us proud.

*Professor V.O. Chude, FSSSN (President)
Professor J. A. Adediran FSSN (Secretary)*

Dan H. Yaalon Symposium

From 8– 11 April 2015 a symposium was held in honour of the late Dan Yaalon, an extra ordinary scientist (1924-2014) who passed away 29 January 2014. The Memorial Symposium took place at the University of Natural Resources and Life Science in the Wilhelm Exner House, Peter Jordan Street in the 18th district of Vienna.

There were 70 participants from four continents, who gave 40 scientific talks and presented 12 posters. The participants were welcomed by the vice rector of the BOKU Georg Haberhauer and the president of the Austrian Soil Science Society Andreas Baumgarten. The Memorial lecture on Paleosols was given by Alexander Makeev from Moscow. The two sons of Dan Yaalon David and Uri were present together with their wives. They were impressed by the high level of the symposium and the friendly atmosphere, which was observed throughout. The most important contributions will appear in a Special Issue of the Periodical CATENA.

Furthermore it is planned to issue a Dan Yaalon medal for young scientists. These scientists should have made excellent contributions to the fields of major interest of Dan Yaalon. This medal should be issued the first time during the World Congress of Soil Science in Rio, Brasilia 2018. Highlight and the end of the symposium was an excursion to the birthplace of Dan Yaalon Uherske Hradiste, Czech Republic. At this event the mayor Stanislav Blaha gave a reception at the town hall for all the par-



The sons of Dan H. Yaalon, David and Uri at Uherske Hradiste (Photo: Rachael Cerrotti).



Participants of the Dan H. Yaalon Symposium in front of the Exner- house of BOKU Vienna (Photo: Rachael Cerrotti).



The organizing committee on the Löss-Paleosol-Site Dolni Vestonice(Photo: Rachael Cerrotti).

Participants. Furthermore, two important Paleosoils were presented by Franz Ottner at Stranzendorf and by Jiri Kulhavy at Dolni Vestonice.

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*Daniela Sauer Danny Itkin
Dan Richter Franz Ottner
Karl Stahr*

Report on 2015 Global Soil Security Symposium

By Cristine Morgan, Alex McBratney, Damien Field, Andrea Koch, and Johan Bouma

Scientists, policy influencers, investors, and citizens met at Texas A&M University in College Station, TX from 19th-21st May 2015 to discuss the need for a new focus on soil security. Approximately 85 people from 14 countries and 40 institutions met to discuss the topic of soil security. The Symposium was jointly organized by Texas A&M University, the University of Sydney, the United States Studies Centre at the University of Sydney, the Soil Science Society of America and represents the International Union of Soil Science's contribution to the International Year of Soils. The symposium was generously supported by the Samuel Roberts Noble Foundation, the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Division, and Texas A&M AgriLife Research. Governmental bodies and organizations represented included the Australian Government, USDA, European Commission, and INRES (Industrial Safety and Environmental Protection of France). Attendees participated in a frank and open discussion focused on each participant's perspective on how to achieve soil security.

Soil security requires maintenance and improvement of the soil resource to produce food, fiber, and

fresh water, to contribute to sustainable energy production, adapt to climate changes, and to maintain biodiversity, human health, and function in ecosystems. Those concerned with achieving soil security recognize that attainment involves scientific, economic, industry and political engagement to effectively and credibly inform policy and legal frameworks and implement appropriate actions. Soil security, like food security, has a number of dimensions that interact with environmental, social, and economic components. The discussion at the Global Soil Security Symposium was organized around the five dimensions of soil security, which include (1) capability, (2) condition, (3) capital, (4) connectivity and (5) codification.

To work toward achieving soil security in the next two decades, participants identified goals to secure soil so that it can contribute to solving other global issues. Specific goals for each dimension were designed to achieve the overall goal of soil security, catalyse research and practice, and contribute to soil policy.

Capability

The capability of a soil refers to its potential functionality ("what can the soil do?"). It is well recognized that not all soils share a similar ability to provide the seven soil functions that are distinguished by the Soil Protection Strategy of the European Union (biomass production, filtering nutrients, source of biodiversity,



Participants of the 2015 Global Soil Security Symposium in Texas.

cultural environment, raw materials, carbon pool, heritage). When soil is not managed to its identified capability, negative impacts on soil conditions can occur that negatively affect its contributions towards general ecosystem services. Soil capability needs to be evaluated according to the seven functions. However, the function that is generally focused on is biomass production while neglecting its link with the other functions in a sustainable production system. For each function, there are indicators that evaluate capability. The USDA NRCS Soil Survey Division has developed many (hundreds) soil interpretations as indicators of soil capability and are linked to soil series descriptions. The USDA's empirical estimates can be quantified by process-oriented computer simulations that also allow risk assessments based on soil limitations. Aside from defining soil capability it is also desirable to explore ways in which potentials can be reached using management support systems, with precision agriculture as an important component. Soil capability is also limited by erosion due to natural (i.e. wind and water) or human (e.g. used as building material) forces and by surface sealing. The current rate of surface sealing for the globe is approximately 16,000 ha day⁻¹ over the next 20 years.

To achieve soil security in the capability dimension, one overall goal was identified:
50% of soil is used according to its capability by 2030.

Toward achieving this goal, more specific objectives may include the following:

1. Reduce loss of soils with a high capability to less than 4000 ha per day by 2030;
2. Document successful sustainable land-use systems where soils have been managed to their capability in 50% of the regions (global) by 2030; and
3. Integration of soil capability criteria in 90% of policy-oriented models on climate change, food and energy security, biodiversity loss and water availability by 2025.

Condition

The dimension of soil condition refers to the current state of a soil, reflects human management of soil, and how state and management alters or enhances the seven soil functions. Other concepts of valuing and caring for soil through management include soil health, quality, change, and, resilience. Much of the focus on soil condition is associated with agriculture, but functions of soil not linked to

agriculture (e.g. urbanization, mining, and nature preserves) are equally important. The assessment of soil condition is commonly associated with measurement of soil organic carbon as an indicator of improved soil condition; however, improvements in soil condition or function may not always be reflected by changes in soil organic carbon.

To achieve soil security in the condition dimension, one overall goal was identified:

Soil condition is optimally managed according to the inherent capability in 50% of managed soil systems by 2030.

Toward achieving this goal, more specific objectives may include the following:

1. Reduce soil nutrient depletion by 50% by 2030 against 2015 levels.
2. Increase water capture by 20% by 2030 against 2015 levels.
3. Increase carbon content of agriculture topsoil above 2015 levels by 20% by 2030
4. Reduce soil losses to the tolerable soil erosion rate for 90 % of managed soil by 2030

Capital

The dimension of soil capital refers to the economic and natural capital value of the soil resource. Placing a monetary value on an asset enables a society to value or secure the asset. Therefore a societal focus in soil security can be economically driven. Monetary value also provides a way for capital and risk markets to engage with valuation of soil as an asset for economic flows. Financial incentives that clarify and define natural capital and ecosystem services are ways to value soil. Other indices that describe soil value can exist, but might be more difficult to assess. Examples include soil rarity, soil diversity, or where soil directly provides food for consumption (subsistence agriculture).

The economic value of soil can develop 'top-down' through government, market and institutional frameworks or bottom-up through standards, labelling and social licensing of soil products.

To achieve soil security in the capital dimension, two overall goals were identified:

1. *Increase annual capital value of soil ecosystem services by 5% per annum by 2030; and*
2. *Commercial land values based on full economic value of soil capability and condition, by 2020.*

Toward achieving this goal, more specific objectives may include the following:

1. Natural capital becomes part of 90% of lending decisions by 2030; and
2. Incorporate soil management accreditation into 90 % of environmental stewardship branding or labeling of products by 2030.

Connectivity

Connectivity refers to the connection of individual land managers/farmers with the soil they manage and the broader connection of soil to society and with society to soil. Connectivity also encompasses issues of knowledge, education, training, and awareness.

The group identified many ways to know, understand, and value soil. Aesthetic consideration can drive the general population to appreciate and understand the relevance of soil. Participatory learning by managers and experiential learning at schools have the potential to change mindsets on soil value and management. Inter-generational equity is a strong human driver of soil security. The soil health concept provides an effective means of connecting the importance of sustainable soil management by soil managers with the broader community and the means to help build recognition by society of the important role that soil managers play in maintaining soil function for the production of food, fibre, and other ecosystem services.

To achieve soil security in the connectivity dimension, an overall goal was identified:

90% awareness and understanding of soil security amongst the general public by 2030.

Toward achieving this goal, more specific objectives may include the following:

1. Integrate soil security policy with agricultural policy in nations that are net exporters of food by 2020;
2. Establishment of community gardens in 90% of primary schools globally, supported by a learning curriculum, by 2020;
3. Increase the area of agricultural soil managed by those with soil management certification by 50% by 2030;
4. Engage 0.1% of the population to nurture and connect their values with securing soil by 2030; and
5. Increase the use of practices focusing on soil aesthetics (art, poetry, music, stories, etc) into strategies to secure soil by 100% by 2030.

Codification

Codification refers to the policies, regulations and governance arrangements, in both the public and private sectors that enable soil security.

Many countries have formulated soil policy and regulations. Both carrot (incentive programs) and stick (regulatory penalties) approaches are used. The U.S. has many financed incentive programs that implicitly embed soil security policies. Australia has a free market economy and relies less heavily on government programs; however an issue is that government programs for soil tend to be weighted towards natural resource management programs, rather than treatment of soil security for agricultural productivity.

Soil security is an internally focussed goal for countries that grow and export much of their food and fibre production and an externally focussed goal for those that rely on the soil of other nations for food and fibre through imports. While there are national arrangements, international policy around soil security so far has been missing; possibly due to its importance in different domains, e.g. desertification, food security - causing a degree of ownership conflict. The European Union has made the biggest attempt, so far, through the European Soil Thematic Strategy. Sustainable development goals and similar instruments may offer a way forward.

To achieve soil security in the codification dimension, an overall goal was identified:

50% of national governments recognize soil security in their laws by 2025

Toward achieving this goal, more specific objectives may include the following:

1. Recognition and integration of soil security policy in major international instruments for sustainable development, including the UN-CD, UNCBD and the UNFCCC, and the SDG's by 2025.
2. Soil carbon becomes an indicator for soil-related sustainable development goals by 2020
3. Net exporting food nations integrate soil security with agricultural production policy and governance by 2025.

NEXT STEPS

The discussion of Global Soil Security will continue with a focus of developing dialogue between land managers, multi-disciplinary scientists and policy



makers at the 2016 Global Soil Security Symposium in Paris. Over the next year, a quantitative framework for assessing each of the dimensions will also be developed. As well, those that want to achieve global soil security will continue to increase awareness, through conservation, a book on global soil security that includes the talks shared at the first symposium, and continued conversations within and between governments.

Websites for Presentations

Soil Science Society of America Website:

<https://dl.sciencesocieties.org/publications/meetings/browse/sssas2015GS>

United States Studies Centre Website

<http://ussc.edu.au/events/past/global-soil-security>

IYS in international media

The International Year of Soils was taken up by **BBC Radio** in the episode ‘Soils. What have they ever done for us?’ on January 15, see

<http://www.bbc.co.uk/programmes/b04xrwhc> or
<http://www.bbc.co.uk/podcasts/series/inscience>.

We’re treating soil like dirt. It’s a fatal mistake, as our lives depend on it – The Guardian, March 2015

To keep up with global food demand, the UN estimates, 6m hectares (14.8m acres) of new farmland will be needed every year. Instead, 12m hectares a year are lost through soil degradation. According to the UN’s Food and Agriculture Organisation, the world on average has just 60 more years of growing crops. The intensification of farming over the last century has increased the rate of soil erosion 60-fold. Among the solutions suggested are zero-tillage (also known as conservation agriculture) and permaculture, which means working with complex natural systems.

Read more <http://www.theguardian.com/commentisfree/2015/mar/25/treating-soil-like-dirt-fatal-mistake-human-life>

Other IYS activities

Coloring Book released by the Soil Science Society of America

For the younger set, an IYS Coloring and Activity Book has been developed, based on the monthly themes. Each month's activity has a coloring page and an accompanying activity - a word search, connect the dots, crosswords, and more. It's a fun way to introduce the topic of soils to kids at the K-2 grade level. The full book (or individual pages) are available for download, at no charge. All pages should be credited to the Soil Science Society of America.

Link: <https://www.soils.org/files/iys/iys-color-book-for-web.pdf>

FAO communication toolkit for International Year of Soils 2015

The FAO IYS communications toolkit provides tools and suggestions for informing and engaging the public in soil-related activities. It contains key information and tips. You can use the toolkit videos, photos and promotional materials to increase awareness and understanding of the importance of soils. This material can be shared with community institutions such as schools, local farmers' associations and businesses, and local or national media outlets and government offices.

Download it: <http://www.fao.org/soils-2015/communications-toolkit/en/> and <http://www.fao.org/soils-2015/en/>

Infographic 'Healthy soils for a healthy life' by FAO

Our soils are in danger because of expanding cities, deforestation, unsustainable land use and management practices, pollution, overgrazing and climate change. The current rate of soil degradation threatens the capacity to meet the needs of future generations. As long as soils are at risk, sustainable agriculture, food security and the provision of ecosystem services are compromised.

Links: <http://www.fao.org/soils-2015/en/>; <http://www.fao.org/assets/infographics/FAO-Infographic-IYS2015-en.pdf>

Restoring our soils by learning from history

Most of our ideas about soils ignore the millions of years before mankind started farming. But what happened during the 99.9% of a soil's history contains very important lessons. So let us celebrate the International Year of Soils by looking at what

that history can tell us – and build on those lessons for the future.

<http://www.agriculturesnetwork.org/magazines/global/soils-for-life/conservation-agriculture>.

FAO appoints two scientists as special ambassadors for International Year of Soils

FAO Director-General José Graziano da Silva has appointed two scientists to serve as Special Ambassadors for the International Year of Soils and act as champions for better management of the non-renewable resource he calls humankind's 'silent ally'. Claire Chenu, a French biodiversity expert and professor of soil sciences at Agro Paris Tech University, and Tekalign Mamo Assefa, an expert in soil management and senior government advisor in Ethiopia, will be the ambassadors. Both have years of experience in the policy making sphere and will participate in events around the world geared at motivating relevant stakeholders to take advantage of the International Year of Soils and help increase public awareness, disseminate technical knowledge and promote effective policies. For more details see <http://www.fao.org/soils-2015/news/news-detail/en/c/286319/>



90 Years of Soil Classification of the IUSS

By Hans-Peter Blume, Kiel, and Peter Schad, Freising-Weihenstephan

Soils are the biologically active part of the upper most layer of the Earth's crust, ranging in thickness from a few millimeters of the insertion zone of 20 cm high shrub lichens upon hard rock of Antarctica to several decameters of deeply weathered *Ferralsols* of old land surfaces in the Tropics of South America, Africa or India.

A. IUSS Soil Map of Europe during the 1930s

In the year 1924, the present *International Union of Soil Sciences* (IUSS) was founded as the *International Society of Soil Science* (ISSS) during an *International Congress of Soil Science* in Rome, Italy. The Romanian soil scientist George Murgoci (1872-1925) suggested the creation of a European soil map. For this purpose, *Commission 6 Soil Map of Europe* (later a subcom. of *Comm. 5 Soil Classification*) was established. Murgoci had recommended a map legend (Murgoci 1924), which mainly followed the legend of the colored soil map of European Russia of Dokućaev, Sibirtsev et al. (1900). After Murgoci's death in 1925, Hermann Stremme (1979-1961) from the Free City of Danzig led the joint preparation of the soil map. With the countries, which already had a *soil survey*, he discussed the adaptation of national classifications to the map legend with defined soil types that had been suggested by Murgoci. The *Soil Survey* of the participating countries was described by Stremme (p. 259-384) in the *Handbuch der Bodenlehre* (Blanck 1932). To some countries, which until then had no *soil survey*, he sent his co-workers to help there for several months: Wilhelm Hollstein (1898-1973) to Bulgaria and Eberhard Ostendorff (1905-1984) to Italy (Blume & Finnern 2010). 37 map units were defined, mainly but not exclusively *soil types*, and grouped into 7 sets (Table 1), namely nine *steppe soils* with AC profiles, two *dry forest soils*, eight *wet soils* partly with peat, seven *saline soils*, five *forest soils* (podzolic type with ABC profile, which include real *Podzols* as well as *soils with clay migration*) and *mountain soils*: which are similar to Dokućaev

et al. (1900!). The soil zones were characterized by 11 different parent materials with different texture conditions.

Table 1: Legend of the Soil Map of Europe (1937); slightly shortened

1. Steppe Soils with AC Profile

- Gray soil of the desert steppes
- Light brown soil of the desert steppes
- Dark chestnut-colored steppe soil
- Shallow, humus-poor chernozem (Ah 40-60 cm; humus content < 7%)
- Intermediate, humus-poor chernozem (Ah 70-80 cm, humus content < 7%)
- Deep, humus-poor chernozem (Ah > 100 cm)
- Deep, humus-rich chernozem (Ah > 100 cm, humus content 8->13%)
- Strongly leached chernozem
- Degraded chernozem of forest steppes with ABC profile

2. Dry Forest Soils

- Mediterranean dry forest soil with AC profile
- Mediterranean dry forest soil with ABC profile, A unbleached to visibly bleached, B often reddish or reddish brown

3. Forest Soils (Podzolic Types with ABC Profile) Central + N. Europe

- Brown forest soil, unbleached to slightly bleached
- Bleached forest soil with rusty B
- Strongly bleached forest and heath soil
- Soil with strongly developed iron pan
- Tundra soil

4. Wet Soils

- Peaty soil
- Peaty soil in small patches
- Undifferentiated peat soil
- Fen-peat soil
- Moss-peat soil
- Humus accumulations and gleying in wet forest soil
- Alluvial, marsh + meadow soil in river valleys, and depression wet soil
- Salt marsh soil influence of ground and soil water on color of marsh soil

5. Saline Soils

- Undifferentiated saline soil
- Predominantly solonetz + solonetz-like soil
- Solonetz-like soil scattered in the steppe soil region
- Solonetz soil scattered in the steppe soil region
- Degraded solonetz (solod) solonchak
- Moist salty meadows, salt marshes and temporary salt lakes
- Acid salt soil of moist regions

6. Rock Soils (Skeletal Soils)

- Red soil on limestone (terra rossa)
- Soils of different colors on limestone (rendzina)
- Degraded rendzina
- Mottled clay and marl soil

7. Mountain Soils

- Soils in very hilly and mountainous districts with uneven profile development and strong movement

In 1952, a *discussion on soil classification* was held in Ghent, Belgium, which was organized by R. Tavernier (1914-1992), R. Dudal (1926-2014), J. de Coninck and others on the occasion of a visit of G. D. Smith (1907-1981), USA. Only scientists from Western Europe participated. It was criticized that in different countries different soil classification systems had been developed and no attempts were made to allow a correlation between the systems (Tavernier 1953).

In 1954, Hermann Stremme organized an international soil science meeting in Berlin (East) (Flegel 1954). Among others, Gerasimov and Rozov presented a new soil classification system of the Soviet Union. In comparison to Dokuchaev, soil units were added, which only occur in Asian Russia, e.g. grey-brown desert soils, takyrs soils, cinnamon-colored soils, tundra-gleys (Flegel: p. 32f). A new West German soil classification system was also presented and published. It was developed by Eduard Mückenhausen (Blume 2007) and strongly influenced by the book of the Austrian soil scientist Walter Kubiena (1897-1970) about the classification of European soils (Kubiena 1953). Furthermore, the soil classification systems of France, Austria, Eastern Germany, Poland and Hungary were reported and discussed.

B. The Legend of the FAO-Unesco Soil map of the world 1974

In September 1954, a meeting of the *Sub-Group for Soil Classification and Survey* of the FAO was held in Ghent, Belgium, where the focus lay on the sta-

tus of soil classification and soil mapping in Europe (FAO 1955). There was no participation of Russian and Eastern European scientists.

A European soil map and a soil map of the world were elaborated by the FAO under the leadership of D. L. Bramão (1961-1968), L. D. Svindale (1968-1970) and R. Dudal (1970-1975). The Legend of the Soil map of the world consists of 26 main units, which are further divided into 102 subunits:

Table 2: Soil units of the Legend of the Soil map of the world 1 : 5 M (FAO-Unesco 1974, Spaargaren 1999)

None or weakly developed soils

- J Fluvisols** w. Eutric, Calcaric, Dystric, Thionic subunits:
- G Gleysols** w. Eutric, Calcaric, Dystric, Mollic, Humic, Plinthic, Gelic su
- R Regosols** w. Eutric, Calcaric, Dystric Gelic su
- I Lithosols**

Soils conditioned by parent material:

- Q Arenosols** w. Cambic, Luvic, Ferralic, Albic su
- E Rendzinas**
- U Rankers**
- T Andosols** w. Ochric, Mollic, Humic, Vitric su
- V Vertisols** w. Pellic, Chromic su

Soils from (semi-)arid regions:

- Z Solonchaks** w. Orthic, Mollic, Takyric, Gleyic su
- S Solonetz** w. Orthic, Mollic, Gleyic su
- Y Yermosols** w. Haplic, Calcic, Gypsic, Luvic, Takyric su
- X Xerosols** w. Haplic, Calcic, Gypsic, Luvic su

Soils from steppe regions:

- K Kastanozems** w. Haplic, Calcic, Luvic su
- C Chernozems** w. Haplic, Calcic, Luvic, Glossic su
- H Phaeozems** w. Haplic, Calcaric, Luvic, Gleyic su
- M Greyzems** w. Orthic, Gleyic su

Moderately developed soils mainly from temperate regions:

- B Cambisols** w. Eutric, Dystric, Humic, Gleyic, Gelic, Calcic, Chromic, Vertic, Ferralic su
- L Luvisols** w. Orthic, Chromic, Calcic, Vertic, Ferric, Albic, Plinthic, Gleyic su
- D Podzoluvisols** w. Eutric, Dystric, Gleyic su
- P Podzols** w. Orthic, Leptic, Ferric, Humic, Placic, Gleyic su
- W Planosols** w. Eutric, Dystric, Mollic, Humic, Solodic, Gelic, su

Strongly weathered soils mainly from the tropical regions:

A Acrisols w. Orthic, Ferric, Humic, Plinthic, Gleyic su

N Nitosols w. Eutic, Dystric, Humic su

F Ferralasols w. Orthic, Xanthic, Rhodic, Humic, Acric, Plinthic su

Organic Soil:

O Histosols w. Eutric, Dystric, Gelic su

C. International Reference Base for Soil Classification (IRB)

At the 11th World Congress of Soil Science 1978 in Edmonton, Canada, the necessity of an **international classification system of soils as bodies of nature** was discussed. The Legend of the FAO-Unesco Soil map of the world was considered to be not fully appropriate because it was too much focused on utilization.

At the initiative of Ernst Schlichting (1923-1988), Stuttgart-Hohenheim, Germany, as **Chairman of Commission V** of the IUSS, a group of experts representing various national and international institutions and organizations met at Sofia, Bulgaria, in May 1980 (Dudal 1980), June 1981 and October 1983 (Schlichting 1981, 1986) to discuss the possibility of establishing an *International Reference Base for Soil Classification (IRB)*. This consultation came to the conclusion that a classification of soils should be based on soil properties that reflect characteristics of parent material and effects of soil-forming processes, including soil moisture and temperature regimes.

At the 12th World Congress of Soil Science 1982 in New Delhi, India, a working group for the IRB was established with E. Schlichting as coordinator. 16 working subgroups with different **conveners** and experts were established to prepare classification concepts for the following units (Schlichting 1984, Dudal 1990; NN 1990):

1. **Weakly developed (primic) soils** (Litho-, Areno-, Rego-, Fluvisols): **H. de Bakker**, The Netherlands; R. Arnold, USA; P. Ahm, IBSRAM; S. Krastanov, USSR; J. Comerma, Venezuela; J. Nemecek, Czechoslovakia.
2. **Swell/shrink soils** (Verti-, Pelosols): **J. Bhattacharjee**, India; P. Quantin, France; M. Leamy, New Zealand; P. Ahn, IBSRAM; W. Sombroek, The Netherlands.

3. **Surface water-influenced soils** (Stagno-, Planosols): **H.-P. Blume**, Germany; M. Ciric, Yugoslavia; F. Zaidelman, USSR.

4. **Groundwater-influenced soils** (Gleysols, Thiosols): **M. Ciric**, Yugoslavia; H.-P. Blume, Germany.

5. **Saline/alkaline soils** (Solonchak, Solonetz): **A. Minashina**, B. Stalbovory, USSR; T. Boyadgiev, Bulgaria; C. Chevery, France; R. Chhabra, India.

6. **Aridic soils** (Calci-, Gypsi-, Yermosols): **T. Boyadgiev**, FAO; H.-P. Blume, Germany; A. Ruellan, France; M. Ilaiwi, Syria; T. Boyadgiev, Bulgaria.

7. **Mollic soils** (Kastano-, Chernozem-, Grey-, Phaeozems, Rendzina): **R. Guthrie**, USA; B. Rozanov, USSR; A. Bronger, Germany.

8. **Umbric(= Modic) + shallow soils** (Rankers, Umbrisols): **S. Krastanov**, Bulgaria; J. Hollis, UK.

9. **Sialic soils** (Cambisols, Luvisols): **J. Hollis**, UK; I. Lieberoth, East Germany.

10. **Fersialic soils** (Chromic Cambi- and Luvisols): **J. Dan**, Israel; R. Sant'Anna, Ghana; R. Dudal, Belgium.

11. **Ferralic soils** (Ferralsols, Nitosols): **R.F. Isbell**, Australia; H. Eswaran, USA; W. Sombroek, The Netherlands.

12. **Andic soils** (Andosols): **M. Otowa**, Japan; W. Luzio-Leighton, Chile; P. Quantin, France.

13. **Podzolized soils**: **J.A. McKeague**, Canada, T. Sokolov, USSR.

14. **Organic soils** (Histosols): **R. Farnham**, USA; P. Driessen, The Netherlands; H. Otrutsko, Poland; J. Hollis, UK; J. Nemecek, Czechoslovakia.

15. **Pergelic soils** (with permafrost): **A.V. Sokolov**, USSR.

16. **Anthr(opogen)ic soils** (Hortic, Plaggic, Terric, Irrargic Anthrosols): **A. Kosse**, USA, C.F. Xi, China.

As separate **main units** in addition since 1988 (with **A. Ruellan**, France, as coordinator):

17. **Primic**,

18. **Fluvisol**, 19. **Lixic**, 20. **Calcic**.

The IRB group developed definitions of the 20 units and of the subunits as special or transition forms, but, due to missing financial support and Ernst Schlichting's death in 1988, a joint classification system was not evolved.

In parallel, the Legend of the *Soil Map of the World* of 1974 was revised by **FAO (Rome)**, **Unesco (Paris)** and **ISRIC (Wageningen)** (FAO-Unesco 1988/1990, Dudal 1992) (see B, above). After 1992, WRB took over (see D, below).

Major changes in the **Revised Legend** are:

- The hydromorphic properties were replaced by **gleyic** and **stagnic properties**. The definitions use the rH-values ($rH = Eh (mV)/29 + 2 \text{ pH} \leq 19$), but the source of these definitions was not cited before Jahn et al. 2004/2006.
- The Plinthic subunits of Ferralsols, Gleysols (if the groundwater level is low enough), Acrisols and Luvisols became **Plinthosols**.
- The Lithosols, Rendzinas and Rankers were summarized as **Leptosols**.
- Soils with translocated clay (= **argic horizon**) in the subsoil were extended with the units **Lixisol** and **Alisol**. Luvisols and Alisols of the Temperate Latitudes as well as Lixisols and Acrisols of the Lower Latitudes only differ in the *base saturation* of the subsoil: As this is changed by regular liming, often utilization borders between agriculture and forestry are soil borders at the highest classification level.
- Newly incorporated were the **Anthrosols**: Aric A. (deeply cultivated), Fimic A. (> 5 dm produced by long continued manuring with earthy admixtures), Cumulic A. (> 5 dm sediments by irrigation), Urbic A. (> 5 dm wastes of mining, town refuse etc.).
- Xerosols (humus-poor soils of the semi-deserts) and Yermosols (almost humus-free soils of the deserts) were eliminated. The Calcic and Gypsic subunits became (with extended definitions) **Calcisols** and **Gypsisols**. The Luvic subunits were shifted mainly to the Luvisols. The other subunits were defined as subunits of Regosols and Arenosols. For desert soils, the **yermic phase** was introduced, but it was not cited that the yermic phase is based on the **yermic horizon** after Blume et al. (1984). The yermic horizon has typical topsoil properties and a wide-meshed net of cracks up to one to two meters depth, filled with wind-borne sand (Fig. 1). In the 1970/1980s, Yermosols were mapped in North Africa and the Near East, mainly by consulting companies. Thousands of representative soils were investigated in laboratories. Soil properties and distribution patterns were documented with descriptions, laboratory data and maps, e.g. for Egypt by Alaily (1993) and for Lybia by Petermann (1988). On this background, the elimination of the Yermosols was heavily criticized.

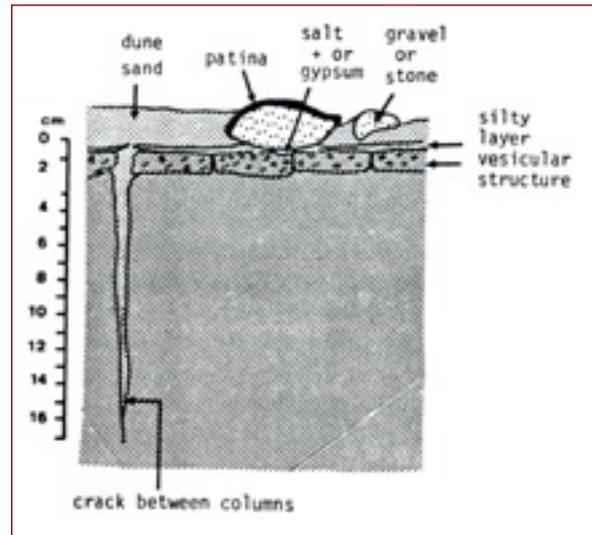


Fig. 1: Characteristics of Yermosols in Egypt and Lybia (Blume et al. 1984: Fig. 3)

D. World Reference Base for Soil Resources (WRB)

During a meeting in 1992 in Montpellier, France, R. Dudal (formerly FAO) convinced A. Ruellan (IRB Chair), H. Eswaran (Chair Comm. V of ISSS), V. Targulian (Vice-Chair Comm. V), D. Creutzberg (ISRIC) and the working group members T. Boyadiev, J. Hollis, M. Ilaiwi, P. Quantin and Gong Zitong to give up IRB for the benefit of a *World Reference Base for Soil Resources* (WRB), which should be based on the Legend and the Revised Legend of the FAO-Unesco Soil map of the world. FAO and ISRIC supported this approach and nominated two soil scientists, O. Spaargaren (ISRIC) and F. Nachtergaele (FAO) (Spaargaren 1993), who published in 1994 the **Draft of a World Reference Base for Soil Resources** (ISSS/ISRIC/FAO 1994). Preceding meetings took place in 1992 in Silsoe, UK, and at the FAO Headquarters in Rome with discussions of the fundamental procedure and of the suggestions to single soil units. The main units were redefined in comparison to the Legend (table 2) and the Revised Legend of the FAO-Unesco Soil map of the world considering the suggestions of the IRB and the WRB working groups. The following list of the soil groups also indicates the conveners for the respective soil group (in italics: joined after 1994):

Histosols (P. Driessen, H. Okruszko): Gelic, Thionic, Salic, Follic, Fibric, Haplic subunits

Anthrosols (Gong Zitong, A. Kosse): Hydragric, Irragric, Cumulic, Hortic subunits

Leptosols (E. Bridges): Lithic, Cryic, Skeletic, Rendzic, Mollic, Umbric, Dystric, Eutric subunits

Cryosols (I. Sokolov, Y. Naumov, C. Tarnocai, S. Smith, B. Jakobsen, D. Gilichinsky, H.-P. Blume, G. Broll, J. Bockheim, J. Kimble): Histic, Thixotropic subunits

Vertisols (J. Seghal): Thionic, Salic, Sodic, Gypsic, Calcic, Dystric, Chromic, Haplic subunits

Fluvisols (D. Creutzberg): Thionic, Salic, Vertic, Mollic, Calcaric, Umbric, Dystric, Eutric subunits

Solonchaks (J. Loyer): Gleyic, Stagnic, Mollic, Gypsic, Calcic, Sodic, Haplic subunits

Gleysols (H.-P. Blume, F. Zaidelman): Cryic, Thionic, Plinthic, Tephric, Arenic, Mollic, Umbric, Fluvic, Calcic, Haplic subunits

Andosols (P. Quantin, S. Shoji): Vitric, Hydralic, Pachalic, Alic, Hydric, Pachic, Eutric, Silic subunits

Podzols (D. Righi): Gelic, Gleyic, Stagnic, Humic, Duric, Umbric, Cambic, Haplic subunits

Sesquisols (W. Sombroek): Petric, Aeris, Albic, Stagnic, Humic, Eutric, Haplic subunits

Ferralsols (H. Eswaran, E. Klamt): Humic, Geric, Gibbic, Lixic, Rhodic, Eutric, Plinthic, Gleyic, Haplic subunits

Planosols (R. Brinkmann): Gelic, Vertic, Histic, Mollic, Umbric, Dystric, Eutric subunits

Solonetz (T. Tursina): Gleyic, Stagnic, Salic, Albic, Mollic, Gypsic, Calcic, Haplic subunits

Chernozems (B. Rozanov, A. Bronger, M. Gerasimova, S. Pazos): Gleyic, Vertic, Luvic, Glossic, Calcic, Haplic subunits

Kastanozems (B. Rozanov, A. Bronger, M. Gerasimova, S. Pazos): Gypsic, Luvic, Calcic, Haplic subunits

Phaeozems (B. Rozanov, A. Bronger, M. Gerasimova, S. Pazos): Gleyic, Stagnic, Vertic, Glossic, Greyic, Luvic, Haplic subunits

Gypsisols (M. Ilaiwi, T. Boyadgiev): Petric, Arzic, Calcic, Luvic, Cambic, Haplic subunits

Calcisols (A. Ruellan): Petric, Luvic, Sodic, Cambic, Haplic subunits

Glossisols (R. Langohr, V.O. Targulian): Gelic, Fragic, Gleyic, Stagnic, Eutric, Umbric, Haplic subunits

Stagnosols (H.-P. Blume): Gelic, Albic, Vertic, Gleyic, Histic, Mollic, Luvic, Haplic subunits

Alisols (B. Delvaux, R. Dudal, J. Deckers, A. Herbilion, F. Volkov, E. Costantini): Plinthic, Gleyic, Humic, Vertic, Ferric, Chromic, Luvic, Haplic subunits

Nitisols (F. Muchena, W. Sombroek): Humic, Mollic, Alic, Umbric, Rhodic, Dystric, Eutric subunits

Acrisols (R. Schargel): Plinthic, Gleyic, Humic, Arenic, Albic, Ferric, Haplic subunits

Luvicols (R. Dudal, J. Deckers): Gleyic, Albic, Vertic, Calcic, Ferric, Chromic, Dystric, Haplic subunits

Lixisols (R. Schargel): Plinthic, Gleyic, Humic, Arenic, Albic, Ferric, Haplic subunits

Umbrisols (J. Hollis, J. Nemecek): Gelic, Skeletic, Albic, Arenic, Cambic, Haplic subunits

Cambisols (O. Spaargaren, M. Laker): Gelic, Gleyic, Vertic, Fluvic, Mollic, Calcaric, Ferralic, Dystric, Chromic, Eutric subunits

Arenosols (M. Laker, A. Remmelzwaal): Leptic, Albic, Protic, Gypsiric, Calcaric, Luvic, Ferralic, Cambic, Haplic subunits

Regosols (R. Arnold): Gelic, Anthropric, Tephric, Gypsiric, Calcaric, Dystric, Eutric subunits. The draft was discussed at the 15th World Congress of Soil Science 1994 in Acapulco, Mexico, and at other meetings in different countries, and it was applied during field excursions.

At the 16th World Congress of Soil Science 1998 in Montpellier, France, the *World Reference Base for Soil Resources* was published (FAO/ISRIC/ISSS 1998). It had been finished by Jozef Deckers (Chair), Otto Spaargaren (Vice-Chair) and Freddy Nachtergaele (Secretary). In opposite to the draft of 1994, the sequence of the main units, now called **Reference Soil Groups (RSGs)**, was partly changed, the **Stagnosols** were deleted, and the **Durisol**s (soils with silcrete of mainly aride climates) were newly included, the latter according to the suggestions of F. Ellis, South Africa. The **Glossisols** (defined to replace the **Podzoluvisols** of the FAO Legend) were renamed **Albeluvisols**, and the **Sesquisols** were renamed **Plinthosols**. A major change was made on the lower level. The strongly hierarchical structure identifying subunits with a key was given up, and 121 **qualifiers** were defined for creating lower-level units. The qualifiers available for use with a particular RSG were listed in a table. The shortest list was given for the Chernozems (9 qualifiers), the longest for the Regosols (29 qualifiers). This system allows adding all applying qualifiers to the name of a soil.

E. Further editions of the WRB

The **second edition** of the WRB was presented at the 18th World Congress of Soil Science 2006 in Philadelphia, USA (IUSS Working Group WRB 2006). The editors are Erika Michéli (Hungary, Chair), Peter Schad (Germany, Vice-Chair) and Otto Spaargaren (The Netherlands, Secretary). Two new Reference Soil Groups were introduced. The **Technosols** comprise soils with materials created or substantially modified or brought to the surface from greater depths, due to industrial or manufacturing processes. The **Stagnosols** unite soils resulting from redox processes due to stagnating water,

but, contrary to the Planosols, without an abrupt textural difference. Some RSGs changed their position in the key. Definitions of diagnostics, RSGs and qualifiers were sharpened. The number of qualifiers was extended to 179. The hierarchies in the lists of qualifiers available for use with a particular RSG were abandoned. For convenience, the qualifiers were divided into prefix qualifiers (to be placed before the name of the RSG) and suffix qualifiers (in brackets, after the name of the RSG).

Soil classification is always based on field soil survey. WRB uses the fourth edition of the FAO Guidelines for soil description (FAO 2006), which was prepared after a 'Field Guide for description, classification and evaluation of soils' of Jahn et al. (2004), of Jahn et al. (2006). It allows recording all soil characteristics that are referred to in the WRB definitions.

The second edition of the WRB was designed for naming soils. But there was an increasing demand to use it for creating map legends, which requires some hierarchy at the lower level. Therefore in 2010, the 'Guidelines for constructing small-scale map legends using the WRB' were published (IUSS Working Group WRB 2010). Without any changes in the definitions, the qualifiers were arranged in a different manner: Main map unit qualifiers were ranked and Optional map unit qualifiers were not ranked and given in an alphabetical order. This allowed constructing map legends with scales down to around 1:250,000.

The **third edition** of the WRB was presented at the 20th World Congress of Soil Science 2014 in Jeju, Korea (IUSS Working Group WRB 2014), edited by Peter Schad (Germany, Chair), Cornie van Huyssteen (South Africa, Vice-Chair) and Erika Michéli (Hungary, Secretary). The third edition is suitable for both classifying soils and creating map legends. The qualifiers are subdivided into **principal qualifiers** (ranked for every RSG, to be placed before the name of the RSG) and **supplementary qualifiers** (not ranked and used in alphabetical order, to be placed in brackets after the name of the RSG). **Retisols** replaced Albeluvisols. Retisols have a broader definition (similar to the definition of the Podzoluvisols of the FAO Legend, 1974) and include all former Albeluvisols. For a better classification of Terra preta, the pretic horizon and the Pretic Anthrosols were introduced. Again, some RSGs changed their position in the key, and the definitions of diagnostics, RSGs and qualifiers were sharpened. The number of qualifiers was extended to 185. Subqualifiers were defined for a further detailed classification.

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IUSS Alerts December 2014 - May 2015

International Union of Soil Sciences



Information for and from the global soil science community

IUSS Alerts are e-mailed to nearly 10,000 people in over 100 countries. 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 2014 and May 2015.

New IUSS-working group on modelling of soil and landscape evolution

Recent decades have seen a strong development of both landscape and soil development models. Therefore, the IUSS working group on modelling of soil and landscape evolution was created to bring together both groups to progress modelling of soilscape development. The WG plans to review papers on the state of progress in the discipline of soilscape modelling, produce an overview of the capabilities of existing soil and/or landscape models and identify what's missing today in models and knowledge on soilscape evolution.

Special exhibition at ISRIC World Soil Museum

The ISRIC World Soil Museum (WSM) is a unique museum with 80 soil profiles on display from all over the world. The total ISRIC soil profile collection contains over 1000 profiles. To be opened soon in the WSM: a special exhibition on the soils of Australia. More about the ISRIC World Soil Museum at <http://www.isric.org/services/world-soil-museum>

Scientists seeking soil bacteria from all around the world

Could the microbial key to the world's next big drug discovery be lying in the soil in your backyard? A citizen science project led by researchers at Rockefeller University in New York is interested in mapping the genetic riches of soil from all around the world. The objective is to discover new bacteria in unexpected (and hard to reach) places, which could lead to the development of new types of antibiotics and other drugs. The Drugs from Dirt project was started by microbiologist Sean Brady. More details at <http://www.sciencealert.com/scientists-seeking-soil-from-your-backyard>

Soil blog of the World Agroforestry Centre in Nairobi

The most recent blog entry by Keith Shepherd, a principal soil scientist, is about how the simplicity of light is revolutionising the measurement of soil health. Marking the International Year of Light and Light-based Technologies and the International Year of Soils, the Soil-Plant Spectral Diagnostics Laboratory of the World Agroforestry Centre in Nairobi, Kenya, explicates how the simplicity of light is used to revolutionise the measurement of soil health. Light technology in the visible, near infrared or mid-infrared ranges provides a spectrum that relates to many soil properties measured the conventional way. The spectral signatures characterise the basic mineral and organic matter composition of the soil, which in turn determine a soil's functional properties. This provides hard evidence for decision makers to prioritize on soil health or to formulate appropriate policy and action.

Links: <http://blog.worldagroforestry.org/index.php/category/soil/>

Rainfall Erosivity in Europe

The erosive force of rainfall is called rainfall erosivity. Rainfall erosivity considers amount and intensity of the rainfall, and is most commonly expressed as the R-factor in the (R)USLE models. The purpose of this study is to assess rainfall erosivity in Europe in the form of the RUSLE R-factor. Data have been collected from 1,541 precipitation stations in all European Union (EU) Member States and Switzerland, with temporal resolutions of 5 to 60 minutes. The R-factor values calculated from precipitation data of different temporal resolutions were normalised to R-factor values with temporal resolution of 30 minutes using linear regression functions. These data were stored in the Rainfall

Erosivity Database on the European Scale (REDES). Precipitation time series ranged from a minimum of 5 years to a maximum of 40 years, mostly covering the last decade. Data from REDES were interpolated with the Gaussian Process Regression (GPR) model resulting in the European rainfall erosivity map at 500 m resolution. The data are available for download: <http://eusoils.jrc.ec.europa.eu/library/themes/erosion/RainfallErosivity/>

SOER 2015 — The European environment — state and outlook 2015

The ability of soil to deliver ecosystem services — in terms of food production, as biodiversity pools and as a regulator of gasses, water and nutrients — is under increasing pressure. Observed rates of soil sealing, erosion, contamination and decline in organic matter all reduce soil capability. Organic carbon stocks in agricultural soil may have been overestimated by 25%. A coherent soil policy at EU level would provide the framework to coordinate efforts to survey soil status adequately. For more details see <http://www.eea.europa.eu/soer-2015/europe/soil>

Next-generation soil information system of Africa at 250 m resolution published

In Africa, significant amounts of soil nutrients are lost every year due to inappropriate or unsustainable soil management practices. The Montpellier Panel has estimated that the economic loss in Africa due to poverty, climate change, population pressures and inadequate farming techniques is about 68 billion USD per year. This is considered to partially be the result of insufficient use of soil management knowledge. To help bridge the soil information gap on the African continent, ISRIC - World Soil Information, in collaboration with the Earth Institute, Columbia University, World Agroforestry Centre, Nairobi and the International Center for Tropical Agriculture (CIAT), has produced predictions of various soil properties for the whole African continent at 250 m spatial resolution at multiple standard soil depths. This product is referred to as the 'AfSoilGrids250m' data set and is one of the main deliverables of the Africa Soil Information Services project (AfSIS) in 2015.

Read more: <http://isric.org/content/next-generation-soil-information-system-africa-250-m-resolution-published>

Humans cause erosion one hundred times faster than normal

Experts have long linked deforestation and intensive farming to worsening erosion rates around the world. Although studied extensively, increasing erosion rates due to human-induced activities have rarely been quantified by scientists. However, new research conducted by geologists finds that erosion rates in the southeastern United States increased one hundred times after the arrival of European colonists in the 1700s due to tree clearing and unsustainable agricultural practices. Read more: <http://news.mongabay.com/2015/0306-montoro-humans-cause-erosion.html#ixzz3U4873dug>

Soil Lessons: Tea4Science

Students will use a simple method to measure decay of organic matter (plants) by making use of commercially available tea bags. The method consists of burying Lipton tea bags with Green tea and Rooibos tea, and digging them up after three months. The retrieved bags are dried, cleaned on the outside, and weighed on a balance with a minimum of two decimal places (preferably at least three). Thereafter, weight loss, decomposition rate, and stabilization index will be calculated using the collected data by the teacher or the students (if their age allows) using an Excel sheet. The students can take part in a global citizen science experiment by sending their data to the Tea Bag Index Project (in the period mid-2015 to 2018). The students will learn that (1) there is biological activity in the soils, (2) the intensity of this biological activity depends on environmental conditions, and (3) this biological activity has feedbacks that influence climate change. For more details see:

<http://www.soils4teachers.org/files/s4t/lessons/lesson-plan--tea4science.pdf>

Soil Erodibility dataset in Europe

An extension to the existing soil erodibility dataset (EU-25) is made available: the K-factor data are available for the 28 European Union Member States (including Bulgaria, Romania and Croatia). Due to a number of requests from non-EU users, extrapolated datasets are now also available covering also Norway, Switzerland, Balkan states, Moldova and Ukraine. Download the data: <http://eusoils.jrc.ec.europa.eu/library/themes/erosion/Erodibility/>

IPBES - Call for nomination of experts

The Intergovernmental Platform on Biodiversity & Ecosystems Services has launched a call for nomination of experts for deliverables on: 1) a set of regional and subregional assessments of biodiversity and ecosystem services (Americas, Africa, Asia and Pacific, Europe and Central Asia); 2) a thematic assessment of land degradation and restoration; 3) the scoping of a global assessment of biodiversity and ecosystem services. Contact info@globalsoil-biodiversity.org for more information.

Slope Length and Steepness factor (LS-factor)

The European Soil Data Centre (ESDAC) has developed a new pan-European high-resolution soil erosion assessment to achieve a better understanding of the spatial and temporal patterns of soil erosion in Europe. The LS-calculation was performed using the original equation proposed by Desmet and Govers (1996) and implemented using the System for Automated Geoscientific Analyses (SAGA), which incorporates a multiple flow algorithm and contributes to a precise estimation of flow accumulation. The LS-factor dataset was calculated using a high-resolution (25m) Digital Elevation Model (DEM) for the whole European Union, resulting in an improved delineation of areas at risk of soil erosion as compared to lower-resolution datasets. This combined approach of using GIS software tools with high-resolution DEMs has been successfully applied in regional assessments in the past, and is now being applied for first time at the European scale. The LS-factor dataset is in Raster format. Users can download 2 different resolution datasets: a) 100m resolution for the whole EU and b) 25m resolution per country. <http://eusoils.jrc.ec.europa.eu/library/themes/erosion/Topography/>

P-factor (Support practices) at European scale

The USLE/RUSLE (Universal Soil Loss Equation / Revised Universal Soil Loss Equation) support practice factor (P-factor) accounts for control practices that reduce the erosion potential of runoff by their influence on drainage patterns, runoff concentration, runoff velocity and hydraulic forces exerted by the runoff on the soil surface. The P-factor is rarely taken into account in soil erosion risk modelling at sub-continental scale, as it is difficult to estimate for large areas. This study attempts to model the P-factor in the European Union. For this, it considers the latest policy developments in the Common Agricultural Policy, and applies the rules set by

Member States for contour farming over a certain slope. The impact of stone walls and grass margins is also modelled using the more than 226,000 observations from the Land use/cover area frame statistical survey (LUCAS) carried out in 2012 in the European Union. The mean P-factor considering contour farming, stone walls and grass margins in the European Union is estimated at 0.9702 (0.95 in arable lands). The data are available for download: <http://eusoils.jrc.ec.europa.eu/library/themes/erosion/SupportPractices/>

SoilTrEC book on soil for secondary school, 12 factsheets, Publications

The EC funded project SoilTrEC (Soil Transformations in European Catchments) was concluded in November 2014. Among the project outputs were: A book on soil for secondary school students, 12 factsheets on soil relevant issues and a number of important publications in peer review journals. The target audience for the book is school children from 11-18. The soil issues presented can help both students and teachers to think in a holistic way about soil hoping that many of the students will become intrigued enough to study soil science or natural resource economics and/or policy when they go to University. <http://eusoils.jrc.ec.europa.eu/projects/SoiltrEC/Outputs.html>

Expo 2015 & Soil

The Slow Food Theater is a place for meeting and exchange, a venue for organizing talks, debates, film and documentary screenings, theatrical or musical shows, presentations of books or production techniques and much more. The events' themes will be connected to the content of the surrounding space: biodiversity, sustainable agriculture, responsible consumption, the fight against food waste and so on. The theater is an open space, and entrance is free while places are available. It has a capacity of 40 seated, but can hold up to 50-60 people standing. Slow Food will use this space to give voice to its network (farmers, fishers, artisans, Terra Madre food communities, national associations, convivia, Presidia, Earth Markets and businesses operating in harmony with the Slow philosophy) plus other civil society representatives, as well as authors, film directors, photographers and artists who want to present projects in line with our interests. Soil was an issue tackled in the context of the slow food theater at the Expo 2015 on various occasions: <http://www.slowfood.com/expo2015/en/calendario-expo/the-soil-in-danger/>



and <http://www.slowfood.com/expo2015/en/calendar-expo/soil-to-feed-the-planet/>

The German Pavillon is dedicated to Soil: Soil is the basis of our nutrition and a complex ecosystem that supplies plants with all the nutrients they require. Protecting and maintaining soil is therefore essential for food security in the future. <https://expo2015-germany.de/en/exhibition/room/soil>

Better save soil

There is a wealth of concrete local actions and policy initiatives out there that can inspire our thinking about the city of tomorrow, measures for sustainable agriculture and how to secure access to food for everyone. 'Better Save Soil' promotes options for action. This film by Uli Streckenbach is the continuation of the film 'Let's Talk about Soil' premiered at the first Global Soil Week.

<http://globalsoilweek.org/resources/videos/video-better-save-soil>

No quick fix for China's polluted soil

Ada Kong says China's soil pollution problem has global ramifications and needs action at a regional level rather than through an overarching national approach.

<http://www.scmp.com/comment/insight-opinion/article/1783358/no-quick-fix-chinas-polluted-soil>

Soil data, soil information and soil maps

Many have realised that global soil information is currently inadequate for addressing the global challenges of food security, water resource protection and climate change mitigation. However, only in recent years has significant funding been invested in soils information generation across the world. Africa, in particular, is in need of information on soils to help tackle poverty and thus benefit its national economies. In Europe the picture is varied, much existing information on soils is >30 years old and the high expense and practicalities of field surveying limit the collection of new, high-resolution soils data. With 2015 being designated the International Year of Soils, this is the time to be going all-out in raising awareness of the importance of soils information in maximising soil's important functions. For more information see <http://www.thedirtdoctors.com/soil-data-soil-information-and-soil-maps/>

Upcoming Conferences and Meetings

ISMOM 2015 - Soil interfaces for sustainable development

Montréal, Québec, Canada, July 5-10, 2015

Joint international conference of International Union of Soil Sciences (IUSS), Canadian Society of Soil Science (CSSS) and Association québécoise de spécialistes en sciences du sol (AQSSS) celebrating the International Year of Soils. Soil interfaces for sustainable development is the cross-cutting theme that encompasses the interests and scope of attendees affiliated with the ISMOM, CSSS and AQSSS groups. To encourage interaction and networking, conference attendees will be able to submit presentations to, and attend, any scientific sessions sponsored by these groups. The language of the meeting will be English, but presentations in French will also be accepted. Deadline for abstract submission was March 14, 2015. For more details about the conference, please visit the website: <http://ismom2015.conference.mcgill.ca/indexOf50.html?p=home>

International Soil Conference on Sustainable Uses of Soil in Harmony with Food Security

Phetchaburi, Thailand, August 17-20, 2015

The Land Development Department, a long-standing government agency of the Ministry of Agriculture and Cooperatives of Thailand that successfully runs a well-known 'Volunteer Soil-Doctor Program' and promotes sustainable soil management for food security and the well-being of farmers, cordially invites scientists from developing and developed countries and academia, as well as practitioners, policy makers, and interested persons to participate in the 'International Conference on Sustainable Uses of Soil in Harmony with Food Security'. This conference is part of the activities to celebrate the International Year of Soils (IYS) as declared by the United Nations, aiming to welcome contributions (oral presentations and posters) from delegates to exchange views and experiences about sustainable uses of soils in order to secure the food

production for our societies. Abstract submission deadline: 15 February. For more information see: www.idd.go.th/WEB_ISC2015/Index.html

Intensive Training Course on Soil Micromorphology

Zagreb, Croatia, August 17-28, 2015

The lecturers are experienced professors and researchers from the University of Lleida, University of Ghent and Croatian Geological Survey. Since there is a need for interdisciplinary research of soil scientists, archeologists, environmental scientists, geographers and geologists, it is necessary to train scientists in the application of affordable methods. We invited lecturers who are the world's top authorities in this field: Prof. Georges Stoops, Prof. Rosa Maria Poch and Prof. Vera Marcelino; scientists from the Croatian Geological Survey will hold lectures, too. The course will be all-day, interactive, and participants could discuss their own thin sections, too.

Application deadline: May 1, 2015. Maximum number of participants: 30. Fee: approximately 350 Euro. Contact: Igalovic@hgi-cgs.hr

Soil Science in a Changing World

Wageningen, the Netherlands, August 23-27, 2015

The Wageningen Soil Meetings aim to provide a platform for sharing knowledge of soils across the world and across science, engaging in interdisciplinary exchanges of ideas, thoughts, and opinions as well as thinking out of the box and being innovative and creative. Main topics of the conference are climate change, food security, water resources, biodiversity and land functions. The focus is on the contributions of soil scientists to these themes, which will be addressed in a dynamic way by top key-note speeches, challenging debates, inspiring workshops and master classes as well as oral and poster presentations by participants. Deadline for abstract submission is March 23, 2015. For more details visit www.wageningenur.nl/wageningen-soilconference2015

Workshop 'Soils and Paleosols of Brazil'

Campinas, São Paulo State, Brazil, August 23-29, 2015

The workshop is organized by IUSS Commission on Paleopedology and INQUA Project RAISIN, local organizers: Alessandro Batezelli and Francisco S. B. Ladeira

23/8: Welcome reception/dinner, 24-25/8: Field trips to Poços de Caldas (MG), Piracicaba, and Itirapina (SP): Tropical Soils (Ferralsols, Acrisols, Plinthosols, Bauxite profiles etc.), 26/8:

Workshop at University of Campinas, 27-28/8: Field Trip to Cananéia (SP) and Ilha Comprida (SP): Tropical Podzols, including a Quaternary Podzol

Chronosequence, 29/8: Return to Campinas via São Paulo Airport. Registration and abstract submission open until 15 July 2015. Website: <https://ppsg2011.uni-hohenheim.de/94442>

Pedometrics and Soil-Landscape Modelling Conference

University of Cordoba (Spain), September 14-18, 2015

The conference features a workshop with the IUSS working group on Soil-Landscape Modelling. Submission deadline for abstracts: April 30, 2015. All aspects of Pedometrics will be covered, including soil-landscape modelling: mechanistic & empirical approaches, soil morphometrics, soil sampling and monitoring, field experimental design, digital soil mapping and proximal soil sensing, Bayesian statistics and hierarchical modelling in soils, uncertainties and fuzzy cognitive mapping, soil spatial and temporal scaling, soil ecosystem services. For further info see <https://sites.google.com/site/pedometrics2015/registration-and-abstract-submission>

8th International Conference of the Working Group on Soils in Urban, Industrial, Traffic and Mining Areas (SUITMA 8)

Mexico City, September 20-25, 2015

After successful meetings in Germany, France, Egypt, China, United States, Morocco and Poland, the working group invites now to Mexico City to witness one of the largest mega-cities in the world and discuss the implied soil management challenges. The main campus of the National Autonomous University of Mexico will host the congress. One day excursions to sites within the city, as well as pre- and post-conference tours to the surroundings will be offered. Working sessions will focus on: Urban soils as archives of settlement history, water management in urban areas, pedological hazards in urban and peri-urban areas, urban soils and biodiversity, urban soils and human health, planning and management of urban soils, food production in urban and peri-urban areas, restoration and reclamation of environmental liabilities (mining and industrial), education strategies to promote awareness on urban soil ecological functioning. See our webpage for further information: <http://www.geologia.unam.mx/~cisu/suitma8/>.

Soil Functions and Climate Change - do we underestimate the consequences of new disequilibria in soil properties? - SUSTAIN 2015

Kiel, Germany, September 23-26, 2015

For further detailed information see:

<http://www.soils.uni-kiel.de/de/sustain-2015>

International University Meeting of Soil Sciences – soil functions in nature and their conservation in ecosystems (IYS activity)

Cultural Academic Centre of the UNAM, Juriquilla, Querétaro, México, October 4-10, 2015

For further information check the event website: soil2015.geociencias.unam.mx or contact 2015@geociencias.unam.mx.

International Youth Forum on Soil and Water Conservation (IYFSWC)

Nanchang, China, October 16-18, 2015

The purpose of the conference is to bring researchers, practitioners and policy makers a worldwide platform to share their research and discuss creative solutions related to soil and water conservation. IYFSWC is focusing to see the 'old' soil and water conservation problems in the vision of the youth. Under the theme 'Youth – the Future of Soil and Water Conservation', a number of topics shall be explored, including soil erosion processes and modelling; global changes and soil conservation practices, land degradation and food security, watershed management, sustainable development for soil and water, new technologies for monitoring and assessment of soil erosion and youth engagement/education in soil and water conservation. Further information: <http://iyfswc.nit.edu.cn/>

The 9th International Symposium on Plant-Soil Interactions at Low pH

Dubrovnik, Croatia, October 18-23, 2015

Topics include: physical- chemical and biological properties of acid soils, physiological and molecular mechanisms of plant adaptation to acid soils, genetics and breeding of crops for acid soils, aluminum toxicity, P deficiency, and other acid soil limitations; amelioration and remediation, sustainable utilization and management of agricultural and natural ecosystems on acid soil, chemistry and management of acid – sulfate soils, forestry and agroforestry on acid soils, soil acidity effect on food chain (food quality, nutrition and human health). For more information, please go to: <http://www.agroekologija.eu/9thpsilph/>

International Symposium on Forest Soils 2015 (ISFS2015)

Fuzhou, China, October 24-28, 2015

The theme of the Symposium is 'Linking Soil Processes to Forest Productivity and Water Protection under Global Change'. The major objective of this symposium is to facilitate the development of international cooperations, scientific exchanges and strategic alliances in forest soil issues, leading to fully realized, collaborative research programmes that face the realities of the effects of forest management and climate change on forest productivity and water supply. Abstract submission deadline: June 4, 2015. For more details visit <http://isfs2015.com/index.asp> or contact Zhiqunhuang@fjnu.edu.cn

7th International Conference of the Africa Soil Science Society

Ouagadougou, Burkina Faso, October 25 to November 1, 2015

This 7th International Conference will gather soil scientists, land planners and users as well as all related specialists to deliberate on the contribution of soil science for a sustainable development in Africa, with special attention on issues such as food insecurity, climate change, land degradation, land and water knowledge management and renewable energies. Deadline for abstract submission: June 1st, 2015. Call for abstracts: <http://start.org/announcements/call-for-abstracts-7th-international-conference-of-the-africa-soil-science-society>

Seminar of the Fires-Soil Network and Iberian-African-American Symposium of Risks, with the theme 'Risks, Forest Fires and Territory'

Faro (Portugal) November 4-6, 2015

The seminar and symposium aim to contribute to disseminate new approaches on the thematic of risks, in particular forest fires and their implications in the territory. To this end, several issues will be debated, not only related to forest fires and their effects on soils, but also new technologies in risk management; prevention techniques, security and risk mitigation; analysis, governance and communication of risks. Additional information may be found on the webpage of the Seminar: http://www.uc.pt/fluc/nicif/riscos/Congresso/ISRIS_ENG

28th Bi-annual Conference of the Soil Science Society of East Africa (SSSEA) & African Celebration Meeting of the International Year of Soil

Morogoro, Tanzania, November 23-27, 2015

Theme: Soils and Land Use for Climate Smart Agriculture. Deadline for abstract submission: 30 July, 2015; full papers in electronic version to be submitted by 30th October 2015. For further information contact the Organizing Committee SSSEA at amurnyambilila@yahoo.com.

Celebration of International Year of Soils 2015, Achievements and Future Challenges

Vienna International Centre, Austria, December 7, 2015

The IUSS together with the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture is organizing this conference in Vienna to celebrate the International Year of Soils (IYS) together with the World Soil Day (WSD).

Speakers from regional soil science societies (Africa, East and Southeast Asia, Europe, Latin America and North America), the IUSS Council, the chairs and vice-chairs of the IUSS Divisions, Commissions and Working Groups as well as several high level representatives from FAO, IAEA and institutional partners will be invited to discuss the achievements of the IYS and the future challenges in soil science as well as opportunities for international cooperation.

2nd International Workshop SOMpatic on 'Soil Organic Matter Balance methods as practice-applicable tools for environmental impact assessment and farm management support'

Rauischholzhausen, Germany, December 8-10, 2015

With the term 'soil organic matter balances' we refer to practice-applicable models for the assessment of the supply of organic matter to arable soils. To achieve applicability in practice, such models must cope with a very low availability of input data. Therefore, they are very much dependent on a reliable and robust parametrization. The 2nd workshop will address this issue with the aim to elaborate an overview of the state of data for the parametrization of soil organic matter balance models.

More at <http://www.uni-giessen.de/cms/sompatic>

2016

8th International Acid Sulfate Soil Conference

College Park, Maryland, USA, July 17-23, 2016

This conference will provide a forum for the exchange ideas regarding the origins, properties, management, classification and reclamation of acid sulfate soils. It will also include components for the education of those less familiar with acid sulfate soil issues and problems. Three days will be designated for oral and poster presentations (July 18, 19 and 21). Additionally, 2-3 field tours are planned throughout the week. Further information on this conference can be found at <http://www.midatlanticsoilscientists.org/acid-sulfate-soils-conference>

Enzymes in the Environment; Activity, Ecology and Applications

Bangor, Wales, United Kingdom, July 24-28, 2016

IUSS members will be well represented at this meeting. We have been able to attract highly esteemed speakers including acknowledged leaders in soil and aquatic microbiology such as the late Jeff Ladd, M.A. Tabatabai, Hans-Georg Hoppe, Soren Sorenson, J.D. Van Elsas, Gerhard Herndl, Paolo Nannipieri, Ellen Kandeler, William Frankenberger, Jr., Tom Speir, Elizabeth Wellington, Jürgen Marxsen, Jim Lynch, Jose M. Barea, Liliana Gianfreda, Patricia Holden, Ryszard Chrost, Hillary Lappin-Scott, Robert Tate, Jody Deming, Chris Freeman, and Farooq Azam.

Although enzymes are central to cellular functions, this conference focuses on the role of soil enzymes in biogeochemical and ecosystem processes, known as ecological or environmental enzymology. The four-day meeting will have the following symposia: Molecular Biology and Enzyme Expression; Spatial and Temporal Patterns of Extracellular Enzyme Activities; Aquatic Ecosystems, Applications of Industrial Environmental Enzymology; and Soil Ecology and Biochemical Cycles. For More Information, please visit: <http://www.oardc.ohio-state.edu/ee2016/>

15th International Peat Congress 2016 (IPC 2016)

Kuching, Sarawak, Malaysia, August 15-19, 2016

The theme of the congress is 'Peatlands in Harmony – Agriculture, Industry & Nature'. Presentations will relate to an integrated global perspective for the responsible use of peatlands and the preservation of their unique dynamics and natural biodiversity. The Congress will also provide for researchers,

academics and practitioners, an ideal platform to congregate, share information and discuss their scientific results and experiences, with particular reference to peat and peatlands in tropics. For further information, please visit www.ipc2016.com.

2018

21st World Congress of Soil Science (WCSS)

Rio de Janeiro, Brazil, August 12-17, 2018

The theme will be 'Soils to feed and fuel the world'. The (WCSS) is the main event of the IUSS. It takes place every 4 years and is open to all Members of the IUSS and other participants. For further information go to www.21wcsc.org or contact Flavio Camargo, Vice President Congress, at fcamargo@ufrgs.br

Five Questions to a Soil Scientist

Five questions to Dr. Dorin Tarau



Name: Dr. Dorin ȚĂRĂU

Position: Teacher at the 'Research Center for Environment Engineering and geospatial data' at Banat's University of Agricultural Sciences and Veterinary Medicine 'King Michael the I-st of Romania'

Address: Banat's University of Agricultural Sciences and Veterinary Medicine 'King Michael the I-st of Romania'
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E-mail: dorintarau@yahoo.com

1. When did you decide to study soil science?

I decided to study soil science in 1975 - 1976 (fifth year of faculty) during the establishment of Research in experimental fields and Pedology and Agro-chemistry compartments, the Office of Pedological and Agrochemical Studies from Timișoara.

2. Who has been your most influential teacher?

The most influential teacher for me was Prof. Dr CV Oprea and Asist.Prof.Dr. Iosif Drăgan (Agronomic Institute from Timisoara, Faculty of Agronomy) and then Prof. Dr. Doc. Dumitru Teaci and Prof. Dr.,Dr. HC Nicolae Florea(ASAS-ICPA Bucharest)

3. What do you find most exciting about soil science?

For me, the most exciting thing about soil science is Soil Engineering and Technology, respectively the rational management methods of renewable natural resources and soil-plant-animal-human relations.

4. How would you stimulate teenagers and young graduates to study soil science?

I stimulate the teenagers and young graduates to study soil science through:

- periodic training of students on the evaluation methodology of agricultural land and soil mapping in the field
- guidance of the research work on pedological and agrochemical studies (1993- present), giving technical assistance to units and their production specialists,
- as a teacher at the 'Research Center for Environment Engineering and geospatial data' at Banat's University of Agricultural Sciences and Veterinary Medicine 'King Michael the I-st of Romania' from Timișoara, in direct collaboration with ICPA Bucharest.

5. How do you see the future of soil science?

I believe that the future of soil science is related to how the experts in soil science will be able to manage the concept of 'soil, natural resource with multiple functions'.

Five questions to Lin Yang



Name: Lin Yang

Position: Vice Chair of Pedometrics Commission

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Chinese Academy of Sciences

E-mail: yanglin@lreis.ac.cn

1. When did you decide to study soil science?

I decided to study soil science in the year 2004 when I was a master student. My master major

was actually geography. But my thesis was about extracting knowledge on the relationship between soil and the environment and digital soil mapping based on the extracted knowledge. Thus, I started to study soil science.

2. Who has been your most influential teacher?

Prof. A-Xing Zhu, who is a professor at both the University of Wisconsin-Madison and the Chinese Academy of Sciences (CAS), is my most influential teacher. He was my master and Ph.D tutor, and now I work with him in CAS. He is a very wise, hard-working and accomplished scholar. He developed SoLIM (Soil Land Inference Model), a new soil mapping technology, to improve the methods, efficiency and accuracy of the soil survey. And he always has considerable insight into developments of soil science. He also devotes a lot of time to discussions with his students on their research work. One of the most important things I learned from Prof Zhu is that you should be serious about every job you take and do your best.

3. What do you find most exciting about soil science?

In my opinion, it is most exciting that research work in soil science can really help people. For example, the soil maps we produce can guide farmers with regard to rational and intelligent fertilization.

4. How would you stimulate teenagers and young graduates to study soil science?

For teenagers, I would carry out interesting courses delivering soil knowledge and take them to 'play' with soils in the field. For young graduates, I would show them advanced soil mapping techniques and take them to the field to see soils.

5. How do you see the future of soil science?

I think soil science can provide essential data to global and regional models, i.e. climate change models, regional ecological models. Thus soil scientists need to develop new soil mapping algorithms and techniques which can deal with environmental covariates data of a large volume and produce more accurate and detailed small-scale soil maps.

Five questions to Rosa M. Poch



Name: Rosa M. Poch

Position: Full Professor, Universitat de Lleida

Age: 52

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1. When did you decide to study soil science?

During high school I enjoyed biology, physics and maths. But it was only after reading old writings of my grandfather, who was a viticulturist and political activist in favour of the farmers, that I understood his love for the land and I decided to go for Agricultural Engineering, at the Polytechnic University of Catalonia. Somehow, I must have it in my genes. Soil Science was a compulsory subject, and I found it fascinating. The year after I passed the subject I was dropping in now and then in the Department of Soil Science to join field trips to see more soils. During one of these drop-in's, my professor told me that in half an hour they were leaving to the west of Spain to look for alkaline soils, with Christian Walter, who was a visiting student at that time; and invited me to join them. At first I said no, but being half way home, I turned back and accepted. On our way we crossed Madrid and visited Carlos Roquero, an old Soil Science professor, who impressed me because of his deep knowledge of Spanish soils. Now I think that hunting natic horizons in that field trip made me decide to be a soil scientist.

2. Who has been your most influential teacher?

My professor at that time, Jaume Porta, was the most influential, because he made me realize the importance of soils, and encouraged me to continue my studies in Ghent. Since then, I'm also very much indebted to Georges Stoops, who made me aware of how fascinating soils are when viewed through the microscope. Both of them were my PhD co-promoters. Other people

that I admire for their rigour, honesty, value of hard work in science and love for soils are Jaime Boixadera, Josep M. Alcañiz, Rob Fitzpatrick, E.A. FitzPatrick and Jan Hopmans. And I'll never forget Narcís Teixidor, who was never a lecturer, but whose enormous knowledge and enthusiasm for soils I deeply admired.

3. What do you find most exciting about soil science?

The fact that - more than in other sciences - there are always things to discover about how soils are formed, how they behave and how they will react to future changes. In soil science it is amazing how paradigms and theories can appear and disappear in a short period of time. Also, I am of the opinion that you can't be a soil scientist without being an activist, which doesn't happen in most of the disciplines or professions.

4. How would you stimulate teenagers and young graduates to study soil science?

I have been lecturing to first year students, and I find it a challenge to convey them my excitement and the pleasure I feel when I try to understand soils and their environment. When I am with students, I try to remember how I felt when I was a student and try to use the arguments that would have convinced me at that time. I was working with secondary school teachers for some years, preparing the University access tests on Earth and Environmental Sciences, and I was always trying to write questions where you could realize the usefulness of soil science as an individual science, considering soil as a natural body. We also organized a summer course for more than 15 years, where we spent most of our time in the field showing the soils of the Pyrenees to school-teachers, students of secondary school, naturalists,... and it's amazing how much they can learn only by looking at them. Definitely, the best place is in the field.

5. How do you see the future of soil science?

This topic is the subject of a great deal of ongoing discussion, and to make it short, I don't like to dilute soil science in environmental sciences. I have seen how the credit-hours allocated to earth sciences are being progressively reduced with each change of curriculum, in spite of our efforts fighting against new waves, such as biotechnology, for instance. This is leading to anomalous situations where you have to explain basic soil science to MSc students. There is no magical solution, but

I think that it's partly our fault and that in each of our reports, theses, projects, works for companies, we must make people aware of the usefulness and uniqueness of soil science in environmental studies.

Five questions to Augusto Zanella



Name: Augusto Zanella

Position: Vce-chair of IUSS Commission Soil Classification

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1. When did you decide to study soil science?

With the aim of improving a dataset, a forest service in the central part of the Italian Alps wanted a more performing key of humus forms classification. The manual in use was obsolete and the service contacted the University of Padua for collaboration with a soil specialist. I had just finished my doctorate about forest typology and accepted the appointment, which took place in Trentino, my native Alpine region. The new manual was published in 2001.

2. Who has been your most influential teacher?

Three professors generated with equal strength my soil passion. Lucio Susmel (University of Padua, Italy) dedicated about half of his lessons on Forest ecology to soil. He was accustomed to saying: "when you know the soil, you know the essence of every ecosystem". He considered the soil as a biological finalized result: in a given forest station (climate, rock and dynamic situation), plants and animals have to cooperate for building the soil, a mandatory source for their common development. No soil, no common growth. Giorgio Dell'Agnola (University of Padua) said that soil and plants speak one to another "better than me and you do". I loved his chemical approach to soil

science. As a student, however, I thought that he intentionally overstated the role of the hormone-like molecules, as a joke, these organic molecules being the objects of fructuous investigations of his laboratory; only recently I understood the fundamental importance of humus in soil functioning. For Philippe Duchaufour (University of Nancy, France) the soil was a well-integrated element of a given ecosystem. The soil name was secondary for him, much better and enjoyable to have an accurate field description of the soil itself and to circumscribe the frame of its genesis. He presented the soil as a fascinating dynamic process, as a strange interface in an unstable equilibrium that a soil scientist can approach and describe but never completely understand.

3. What do you find most exciting about soil science?

In the soil occurs the junction between life and death. In the soil dead organisms are decomposed to elements that start a re-composition, like notes of a score that may compose new awful songs. The complexity of terrestrial ecosystems starts in the

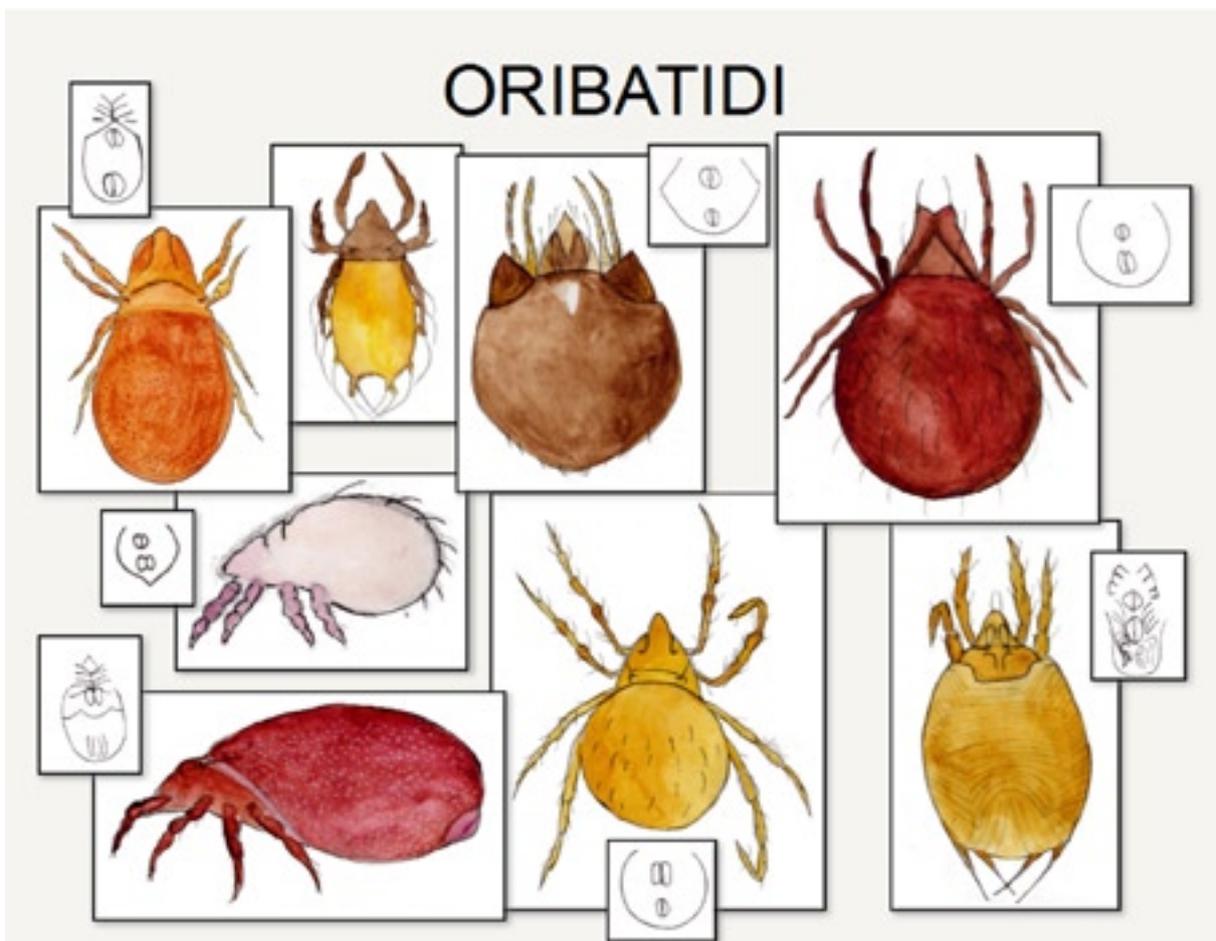
soil and is fed by endless processes of recycling that also take place in the soil.

4. How would you stimulate teenagers and young graduates to study soil science?

You cannot teach soil indoor. That is a great point on our side, because young people like to be learning outdoor on sunny days. Thus, even opening a profile can excite them and naturally creates a favourable atmosphere for teaching soil. Rain can be an awful enemy, indeed, and only few among them finally fall under "soil science attraction". I remember a student who observing soil animals through a microscope, began to draw mites. She made such nice watercolours of them that every other student wanted to look at them in reality, and came home with a copy of the table for illustrating the scary beauteousness they had seen to friends and family.

5. How do you see the future of soil science?

Even if soil science still not has the due importance even in agriculture and forest domains, I sense a



Mites of the litter of an Alpine Spruce forest. Watercolours by Nadia Artuso (student, 2004).



new positive wind, probably due to urgent imperatives. In fact, as human population we are in need of soil:

1. as source of more organic food, in order to support an increasing demand for healthy alimentation;
2. to deal with the observed global warming/climate change, that is well-related to the soil carbon release and storage;
3. to support the biological pyramid that bears Homo sapiens at its apex. This structure is deeply rooted in the soil, on the one side because of the huge mass and biodiversity of soil organisms, on the other because these organisms ensure the cycles of vital molecules and natural elements.

We cannot carry forward these imperatives without investing in soil science.

Five questions to Tsuyoshi Miyazaki

Name: Tsuyoshi Miyazaki,
Position: Professor Emeritus at the University of Tokyo; Vice-chair of IUSS Commission 2.1 Soil Physics
E-mail: t_miya8519_1102@yahoo.co.jp

1. When did you decide to study soil science?

In 1970, when I was learning Soil Physics at the University of Tokyo, Japan, as an under graduate student, I decided to study soil science.

2. Who has been your most influential teacher?

Dr. Masashi Nakano, who was an assistant professor at the University of Tokyo, has been my most influential teacher. Prof. Dr. Shingo Iwata and Prof. Dr. Donald R Nielsen were also quite influential for me.

3. What do you find most exciting about soil science?

I find most exciting about soil science when I talk about soil degradations in the world. Therefore, I always emphasize the significance of keeping soils healthy to realize sustainable societies.

4. How would you stimulate teenagers and young graduates to study soil science?

Curiousness is always attractive for teenagers and young graduates. That's why I always give them many questions why they are so porous, why they

can buffer the extreme changes of environments, why they can hold water, ions, and many micro materials inside, and many other whys.

5. How do you see the future of soil science?

Soil science should collaborate more with regional sciences. Both urban and rural regions have their own environmental issues which are, to some extent, relating to the soils where they are living. I see that the future of soil science may contribute more in fields and the collaboration with many other field sciences will open the door for the future. For example, salinization of soils is deeply related to the irrigation and drainage systems in the region.



New Publications

Preferential Flow – Stokes Approach to Infiltration and Drainage.

By P. F. Germann. November 15, 2014. Geographica Bernensia. ISBN 978-3-905835-34-2 (Softcover) 216 pages. Price 50.00 €. Place order at gb@giub.unibe.ch

There are two ways of irrigating a potted plant: Water is either added to the plate at the pot's bottom from where the soil sucks it up gradually or it is sprinkled on the surface from where it infiltrates and drains rapidly. Preferential flow deals with the second type of flow. This book offers a concept based on first principles of hydrodynamics, leading to viscous flow in permeable media. Viscous flow is considered an independent addition to capillary flow according to Richards (1931). The issues are easy to understand, requiring but skills in mathematics and physics offered to BSc-students attending university science courses. Part I develops a track of concepts from Newton (1729) to Stokes (1845, 1851) and then Lamb (1932), supplemented with the mathematical tool of the kinematic wave theory of Lighthill and Witham (1955). Part II applies these principles to data recorded in systems of various complexity. It also explores the theory's limitations in space and time. In addition, it provides information detailed enough that the readers can calculate the examples for themselves as personal exercises.

Soil Management of Smallholder Agriculture

Edited by Rattan Lal, B.A. Stewart. CRC Press. 2014. 420 pages. Advances in Soil Science. Nearly two billion people depend on hundreds of millions of smallholder farmers for food security. Yet, these farmers' lives also hang in the balance due to their extreme vulnerability to the risks of soil degradation and depletion, soil exhaustion, climate change, and numerous biotic and abiotic stresses. Soil Management of Smallholder Agriculture explores the potential smallholder agriculture hold for advancing global food security and outlines the challenges to achieving this goal. The book addresses the challenges and opportunities that resource-poor and small landholders face and provides recommended management practices

to alleviate soil-related constraints, and increase and sustain crop yield and production. It discusses the cultural, economic, social, and technological aspects of sustainable soil management for smallholder farmers. It then examines soil-related and institutional constraints, principles of sustainable agriculture, soil quality improvement, nutrient and soil fertility management, soil carbon sequestration, soil security, efficient use of resources, and agronomic production.

The Soils of Antarctica

Edited by James Bockheim. World Soils Book Series. 2014. 290 p. 201 illus., 144 illus. in color. Includes first comprehensive description of key soil taxa, along with color photographs of Antarctic soils, first maps of Antarctic soils. It updates last book on Antarctic soils published in 1987. This book divides Antarctica into eight ice-free regions and provides information on the soils of each region. Soils have been studied in Antarctica for nearly 100 years. Although only 0.35% (45,000 km²) of Antarctica is ice-free, its weathered, unconsolidated material qualify as 'soils'. Soils of Antarctica is richly illustrated with nearly 150 images and provisional maps are provided for several key ice-free areas.

Phosphate in Soils. Interaction with Micronutrients, Radionuclides and Heavy Metals

Edited by H. Magdi Selim. CRC Press. 2015. 376 pages. Phosphorus-induced (im)mobilization of heavy metal(loid)s in soil-plant system. Influence of phosphates on copper and zinc retention processes in acid soils. Adsorption-Desorption Kinetics of Zn in Soils: Influence of Phosphate. Phosphorus Fertilizer Effects on Cadmium Availability in Crops and Soils. Phosphorus Fertilizer Effects on Cadmium Availability in Crops and Soils. Multi-component modeling of phosphate and arsenic reactions and transport in soils and geological media. Simultaneous Transport of Vanadium, Cadmium and Phosphate in Soils. Long Term Soil Application of A Sewage Sludge Rich In P on Heavy Metals Bioavailability to Plants. Effect of phosphate addition on mobility and phytoavailability of heavy metals



in soils. Bioavailability of trace elements in soils amended with high-phosphate materials. Influence of phosphates application on soil metal speciation, mobility and bioavailability.

Soil Atlas: Facts and figures about earth, land and fields

Edited by Christine Chemnitz and Jes Weigelt. Published by the Heinrich Böll Foundation, Berlin, Germany, and the Institute for Advanced Sustainability Studies, Potsdam, Germany, January 8, 2015. The international community has set itself three important goals: to stop the loss of biodiversity, keep global warming to 2° Celsius, and ensure that everyone has the right to adequate food. Without fertile soil, none of these objectives will be achieved. In fact, the soil can do its job only if the life it contains is intact, the humus layer is healthy, and land rights are protected. 2015 is the International Year of Soils, a special opportunity for us all to further the goal of soil protection. This Soil Atlas shows why soils should concern us all and what can be successfully achieved by determined people and organisations.

Field and Laboratory Investigations in Agroecology, Third Edition

By Stephen R. Gliessman. CRC Press, December 19, 2014, 256 Pages, ISBN 9781439895719. Price (paperback) £25.99. This manual facilitates hands-on learning that involves close observation, creative interpretation, and constant questioning of findings. The investigations emphasize the importance of careful data interpretation and presentation and the value of a clear, concise, and well-written research report. The book uses simple statistical analysis for data management and interpretation and students are guided through the steps of data analysis in the context of the particular investigations in which it is employed.

Geotherapy: Innovative Methods of Soil Fertility Restoration, Carbon Sequestration, and Reversing CO₂ Increase

By Thomas J. Goreau, Ronal W. Larson, Joanna Campe. CRC Press, December 19, 2014, 630 pages, ISBN 9781466595392. Price (hardback) £76.99. The book outlines the basic concepts of geotherapy and highlights the importance of healing the biosphere's ability to store soil carbon to prevent climate change impacts. Facing challenges head on, it addresses how and why policymakers have underestimated the long-term impacts of climate

change and how we can correct the flawed carbon management mechanisms today. The book also includes where carbon can be most effectively stored, how quickly that can be done, and the practical and policy actions needed to get there.

Practical Applications of Agricultural System Models to Optimize the Use of Limited Water

Edited by Lajpat R. Ahuja, Liwang Ma, and Robert J. Lascano. Advances in Agricultural Systems Modeling - Transdisciplinary Research, Synthesis, and Applications, Volume 5, December 5, 2014, 492 Pages. ISBN: 978-0-89118-343-3 (print), ISBN: 978-0-89118-344-0 (digital). Price \$150.00. Completely devoted to the application of models to optimize the use of limited water and nutrients in various climates, this collection will inspire confidence in the capacity of modeling to tackle the biggest threats to secure agriculture. Well-tested process models of cropping systems can extend field research results to apply to long-term weather conditions, as well as other climates and soils, allowing us to explore new management options. The case studies presented in this volume are promising examples of these kinds of solutions.

Soil Security for Ecosystem Management

Edited by Kapur, Selim and Ersahin, Sabit. Mediterranean Soil Ecosystems 1, Series: Springer-Briefs in Environment, Security, Development and Peace, Vol. 8, Subseries: Mediterranean Studies, December 2014, 167 Pages. ISBN 978-3-319-00699-4. Price (softcover) \$49.99. The term 'Soil Security' is used in the context of maintaining the quality and quantity of soil needed in order to ensure continuous supplies of food and fresh water for our society. The topics included in this unique book on the management of soil sustainability in the Mediterranean region include: soil information, land degradation, land desertification, pedoenvironments, and the carbon cycle and sequestration. One of the main focuses of the book is the description of new approaches that have been adapted to suit interdisciplinary soil ecosystem management in order to combat and mitigate desertification. The contributing authors are renowned experts in their fields which cover the subjects on traditional as well as innovative land use and management.

Soil Carbon - Science, Management and Policy for Multiple Benefits

Edited by S A Banwart, E Noellemeyer, E Milne. CAB International, December 2014, hardback, 420 Pages, ISBN 9781780645322. Price \$162.00. This book brings together the essential evidence and policy opportunities regarding the global importance of soil carbon for sustaining the Earth's life support system for humanity. Covering the science and policy background for this important natural resource, it describes land management options that improve the soil carbon status and therefore increase the benefits that humans derive from the environment. Written by renowned global experts, it is the principal output from a SCOPE rapid assessment process project.

Remote Sensing of Soils: Project report from the Federal Office of the Environment

2015. By Hendrik Wulf, Michael Schaeppman, and Philip Jörg (NPOC/RSL) in close cooperation with Titia Mulder (INRA) and Armin Keller (Agroscope). In this study, a number of scientific publications have been reviewed and summarized. In addition to existing limitations, the multifaceted potential of remote sensing to assess information on soil properties and contents are highlighted in the report. The report presents various remote sensing methodologies providing new approaches for systematic environmental monitoring and soil mapping in Switzerland. Established techniques within active, passive, optical and microwave remote sensing are considered as well as proximal sensing that use key soil properties as proxies for soil conditions and characteristics. In addition, opportunities, progress and limitations of remote and proximal sensing data in support of digital soil mapping are discussed, followed by a gap analysis of current remote sensing technologies and products. Available online: <http://www.geo.uzh.ch/en/units/rsl/news>

Understanding Vineyard Soils

By Robert E. White, second edition, hardcover, 280 pages, February 2015, Oxford University Press (oup.com/us). This new edition of Robert White's influential book presents the latest updates on topics such as measuring soil variability, managing soil water, the possible effects of climate change, rootstock breeding and selection, monitoring sustainability, and improving grape quality. The promotion of organic and biodynamic practices has raised a general awareness of 'soil health', often associated with a soil's biology, but which, to be properly assessed,

must be based on a soil's physical, chemical, and biological properties. This book is a practical guide for winegrowers, and the lay reader who is interested in the concept of terroir and wants to discover more about the influence of different soil types on vine performance and wine character.

No ordinary matter: conserving, restoring and enhancing Africa's soils

The Montpellier Panel, December 2014. This report was authored by Agriculture for Impact with advice and inputs from members of the Panel. The primary author, Dr Katrin Glatzel, was supported by Professor Sir Gordon Conway, Emily Alpert and Stephanie Brittain. The authors also acknowledge valuable inputs from Professor Rattan Lal of Ohio State University (IUSS President Elect).

The report can be downloaded from http://ag4impact.org/wp-content/uploads/2014/12/MP_0106_Soil_Report_LR.pdf

Soil Signals

During the International Year of Soils agricultural publisher Roodbont Publishers wants to publish the new book Soil Signals, a practical guide to a fertile soil. This book provides tools for optimising your soil management. It contains plenty of practical advice and many techniques that are directly applicable for farmers. Furthermore, it will help you to get your soil management off the ground successfully! Roodbont Publishers is looking for companies and organisations that would like to collaborate in publishing the book in 2015. The books have been proven to be an excellent marketing tool for educating farmers and farm advisors in soil management. Especially for companies we offer customised editions. Want to now more about the options? Please take a look at www.roodbont.com or send an e-mail to info@roodbont.com

Agricultural Prairies: Natural Resources and Crop Productivity

By K. R. Krishna. CRC Press, January 28, 2015, by Apple Academic Press Reference - 514 Pages, ISBN 978177188053. Price £82. This book is a comprehensive volume that brings together vast knowledge about agricultural prairies in one place, providing concise descriptions of natural resources and their influence on crop productivity. It provides detailed descriptions about natural settings as well as lucid discussions on soil fertility and crop production trends for various agricultural prairies distributed all around the world.

The Soils of Iceland

Edited by Arnalds Olafur. World Soils Book Series, 2015. 183 p., 186 illus., 169 illus. in color, ISBN 978-94-017-9621-7. Price (hardcover) 109,99 Euro. In this new volume in the World Soil series, the various types of Icelandic soils, their different characteristics, their formation, degradation and erosion are reviewed. At the same time, the book also deals with the agriculture and land use in general to give a complete view of Icelandic soils. Hence it offers a guideline for better understanding the unique natural characteristics of Iceland.

Phosphate in Soils: Interaction with Micro-nutrients, Radionuclides and Heavy Metals

By H. Magdi Selim. CRC Press, February 24, 2015, 381 pages, 77 B/W illustrations, ISBN 9781482236798. Price (hardcover) £89. This book utilizes the latest research to emphasize the role that phosphate plays in enhancing or reducing the mobility of heavy metals in soil, and the soil-water-plant environment. It provides an in-depth understanding of each heavy metal species, and expands on phosphate interactions in geological material. The author includes analytical and numerical solutions along with hands-on applications, and addresses other topics that include the transport and sorption modeling of heavy metals in the presence of phosphate at different scales in the vadose zone.

Managing Nitrogen in Crop Production

By Peter Scharf. Published by American Society of Agronomy, Inc., Crop Science Society of America, Inc., and Soil Science Society of America, Inc., March 10, 2015. 80 pages, ISBN: 978-0-89118-623-6 (print). Price (softcover) \$30. Among crop nutrients, nitrogen has the most complex chemistry and behavior in soil, gives the largest yield responses, and is the most difficult to manage. Managing Nitrogen in Crop Production condenses the latest research and thinking from leading experts in nitrogen. The result will increase the understanding of nitrogen and your odds of managing it successfully.

Soils Host a Quarter of our Planet's Biodiversity. International Year of Soils 2015

Published by FAO 2015. Biological diversity or 'biodiversity' is described as "the variability among living organisms from all sources, whether terrestrial, aquatic or marine". It includes the diversity within species (genetic diversity), between species (organism diversity) and of ecosystems (ecological

diversity). Soil is one of nature's most complex ecosystems and one of the most diverse habitats on earth: it contains a myriad of different organisms, which interact and contribute to the global cycles that make all life possible. Nowhere in nature are species so densely packed as in soil communities; however, this biodiversity is little known as it is underground and largely invisible to the human eye. For download: http://www.fao.org/documents/card/en/c/43b565e7-57c2-43c6-b4f0-812091486ed3/?utm_source=twitter&utm_medium=social%2Bmedia&utm_campaign=faoknowledge

Agriculture for Development, No 24, Special Issue on Soils, guest-edited by David Dent

Tropical Agriculture Association, Spring 2015, ISSN 1759-0604 (print), ISSN 1759-0612 (online). Provides a longer, closer look at land degradation; Managing soil carbon; Soil erosion and conservation; Ecological restructuring of agriculture; Soil fertility in sub-Saharan Africa; Healthy soil: for healthy people and landscapes; New ways of looking at the soil profile.

<http://www.taa.org.uk/publications.asp>

Spanish Journal of Soil Science (SJSS)

Vol. 5/1, 2015. The SJSS is a peer-reviewed journal with open access for the publication of soil science research, with no cost for authors, which is published every four months.

More at: <https://sjss.universia.net/issue/archive>

Soil. Skin of the Planet Earth

By Miroslav Kutílek and Donald R. Nielsen, Springer, 2015; 239 pages, 83 illustrations, 14 illustrations in colour. ISBN 978-94-017-9789-4; Price (hardcover): €27.99, £22.00 or \$27.99. The book brings a complete review on soil science; it is unique in its form accessible to readers without knowledge of natural sciences. The main focus of this monograph is to explain the important role of soil and the environment to a broad audience. The authors describe a responsible approach and use of soil, established on a basic knowledge of the nature of soil and the countless ongoing processes within soil and explain the precarious link between soil and regional environment, which is indispensable for plant and animal communities. In addition, the unique roles of soil texture, soil structure and soil pore systems in hydrologic cycles, plant nutrition and conditions affecting the preservation or eventual extinction of soil are described. The book concludes with the principles of soil protection and revitalization.

Heavy Metal Contamination of Soils - Monitoring and Remediation

Editors: Sherameti, Irena, Varma, Ajit, Series Soil Biology, Volume 44, Springer, 2015; 497 pages,. ISBN 978-3-319-14525-9; Price (hardcover): \$ 159,00. Following a description of the various sources and factors influencing the contents of heavy metal pollution in post-catastrophic and agricultural soils, subsequent chapters examine soil enzymes and eggs as bio-monitors, lead adsorption, the effects of arsenic on microbial diversity, and the effects of Mediterranean grasslands on abandoned mines. A third section focuses on the adaptation strategies used by plants and bacteria, such as *Pinus sylvestris* in industrial areas, and the rhizosphere in contaminated tropical soils and soil treated with sewage sludge. Further topics addressed include strategies of bioremediation, e.g. using transgenic plants as tools for soil remediation.

Cryopedology

By Bockheim, James G., Series Progress in Soil sciences, Springer, 2015; 177 pages,. ISBN 978-3-319-08484-8; Price (hardcover): \$ 129,00. This is the first book solely devoted to Cryopedology, the study of soils of cold regions. The analysis treats Cryosols as a three-part system (active layer, transition layer, permafrost). The book considers soil-forming factors, cryogenic processes, and classification and distribution of Cryosols. Cryosols of the Arctic, Antarctica, and the high mountains are considered in detail. The chapters address cryosols and earth-system science, cryosols in a changing climate, cryosols databases and their use, and management of cryosols. The book is rich in color photographs and highlights the author's 43 field trips to Antarctica, the Arctic, and alpine areas.

Soil Survey and Crop Production Tit Bits

By Emmanuel O. U. Okoye Ph. D. The Soil Survey and Crop Production Tit Bits is a 145-page book of simple and well composed text that provides basic information on soils in relation to agriculture, the book attempts to bridge the gap between the vast majority of Nigeria's practicing farmers and extension workers. It is expected to make the technical output of our soil and agricultural scientists more readily comprehended by less technical users. The author specifically addresses this book to students of soil and agricultural sciences in Universities, Colleges of Agriculture and Polytechnics, Personnel of Ministries of Agriculture, Water Resources, Science and Technology, Works and En-

vironmental Sciences. This book will provide the reader with an understanding of the rudiments of soil survey and agriculture with special emphasis on their practice in Nigeria. It is meant to sensitize other scientists and professionals to produce similar textbooks in soils and agriculture for reading and learning by intended sectors. If you are interested acquiring this book, please contact Soil Science Society of Nigeria Secretariat on sssinfo@gmail.com or vchude@yahoo.co.uk.

Soils - Genesis and Geomorphology, 2nd Edition

By Randall Schaetzl, Michigan State University and Michael L. Thompson, Iowa State University; Cambridge University Press; Available as ebook since March 2015. Publication planned for May 2015; ISBN: 9781107016934; hardback; In its first edition, Soils established itself as the leading textbook in the fields of pedology and soil geomorphology. Expanded and fully updated, this second edition maintains its highly organized and readable style. Suitable as a textbook and a research-grade reference, the book's introductory chapters in soil morphology, mineralogy, chemistry, physics and organisms prepare the reader for the more advanced treatment that follows. Unlike its competitors, this textbook devotes considerable space to discussions of soil parent materials and soil mixing, along with dating and paleoenvironmental reconstruction techniques applicable to soils. Although introductions to widely used soil classification systems are included, theory and processes of soil genesis and geomorphology form the backbone of the book. Replete with more than 550 high-quality figures and photos and a detailed glossary, this book will be invaluable for anyone studying soils, landforms and landscape change anywhere on the globe. Find out more at: <http://www.cambridge.org/at/academic/subjects/earth-and-environmental-science/soil-science/soils-genesis-and-geomorphology-2nd-edition?format=HB>

Soil and Water Chemistry - An Integrative Approach, Second Edition

By Michael E. Essington, published April 24, 2015 by CRC Press. Textbook, 656 Pages, 373 b/w illustrations, ISBN 9781466573154. Hardback. Price: £49.99. The second edition of a bestseller, Soil and Water Chemistry: An Integrative Approach maintains the balanced perspective that made the first edition a hugely popular textbook. The second edition includes new figures and tables, new chapters, and expanded exercises in each chapter. It



covers topics including soil chemical environment, soil minerals, soil organic matter, cation exchange, oxidation-reduction, mineral weathering and solubility, surface chemistry and adsorption reactions, acidity and salinity in soil materials, and chemical thermodynamics applied to soil systems.

Soil Physics with Python - Transport in the Soil-Plant-Atmosphere System

By Marco Bittelli, Gaylon S. Campbell and Fausto Tomei, published May 14, 2015 by Oxford University Press. 464 pages, 57 figures and/or tables, 246x171mm; ISBN: 978-0-19-968309-3; Hardback. Price: £55.00, also available as eBook. This innovative study presents concepts and problems in soil physics, and provides solutions using original computer programs. It provides a close examination of physical environments of soil, including an analysis of the movement of heat, water and gases. The authors employ the programming language Python, which is now widely used for numerical problem solving in the sciences. In contrast to the majority of the literature on soil physics, this text focuses on solving, not deriving, differential equations for transport. Using numerical procedures to solve differential equations allows the solution of quite difficult problems with fairly simple mathematical tools. Numerical methods convert differential into algebraic equations, which can be solved using conventional methods of linear algebra. Each chapter introduces a soil physics concept, and proceeds to develop computer programs to solve the equations and illustrate the points made in the discussion. More see <http://ukcatalogue.oup.com/product/9780199683093.do>

The Soils of Taiwan

By Chen, Zueng-Sang, Hseu, Zeng-Yei, Tsai, Chen-Chi. World Soils Book Series, 2015. 127 p. 78 illus., 68 illus. in color, ISBN 978-94-017-9726-9. Price (hardcover) 87,99 Euro. This book presents a comprehensive and up-to-date overview on soils of Taiwan. It includes sections on soil research history, climate, geology, geomorphology, major soil types, soil maps, soil properties, soil classification, soil fertility, land use and vegetation, soil management, soils and humans, soils and industry, future soil issues. The book summarizes what is known about the soils in Taiwan in a concise and highly reader-friendly way.

In memoriam P.H.T. Beckett

(1928-2014)

Philip Beckett, who died in July 2014, was formerly lecturer in soil science at Oxford University and fellow of St Cross College there. He had wide interests, and in one respect sparked a revolution in pedological thought and application.

Philip read chemistry at Oxford, but his principal enthusiasm as an undergraduate was for exploration. In 1947 he was chemist on a University expedition to Iceland. By his account this experience taught him that the expedition chemist's life was one of drudgery: analysing samples while colleagues from other disciplines monopolized exploration of the landscape and also expected the chemist to do the cooking. For this reason he equipped himself with a copy of *The Study of Soil in the Field* by G.R. Clarke, then University Reader in Soil Science, and led the next expedition as a soil surveyor.

That expedition was to Kerman, Iran, and is documented by Anthony Smith in the book *Blind White Fish in Persia* (1952). Smith wrote: 'Philip

dug holes wide and deep, made a cloud of dust and wrote lengthy notes in his book.' In due course Philip's findings on the soil were published in the *Journal of Soil Science*. Other papers described the historical geography of the region, its climate, agriculture, the distribution of blood groups among the population and the qanats (underground tunnels built to channel water from upland aquifers).

After graduation Philip began research under Walter Russell's supervision. On Russell's departure to East Africa, however, he was left without a supervisor and was called up for national service in the army's Intelligence Corps. One of his tasks was to investigate the bogging of British armour in North Germany towards the end of the second World War: why had tanks sunk into what was expected to be firm ground? The reason was that commanders were relying on inference drawn from geological maps without knowing what lay on top of the



Soft going on the Oxford Clay: Philip Beckett, left, with geologists of the Royal Engineers



Philip down below taking a monolith in the Oxford Clay at Wytham.

rocks; they did not know in advance what the soil was like.

Philip returned to Oxford to continue research, but now supervised by R.K. Schofield and on a fresh topic, namely the thermodynamics of exchange reactions of potassium in soil. His papers on that work in the *Journal of Soil Science* brought him world-wide recognition. He was also appointed to the university staff.

In an article in *New Scientist* magazine¹ Philip wrote 'In research, as in life, the most seminal ideas often arise before the mind and imagination have settled into a rut'. He took this principle seriously, resisting narrow specialization. So, while he continued research on exchange processes he was ready to apply himself as a scientist to any interesting problem.

One such came to light because of his ongoing attachment as a Territorial officer to a unit of the British Army's Royal Engineers in which he rose to the rank of major.

That unit identified the need for information on the soil to predict going conditions for vehicles and for makeshift roads and airfields, and it per-

sued the government to fund research into the matter for both military and civil purposes. The received wisdom at the time was that all could be achieved with conventional soil maps. Philip was unconvinced, and for two reasons: (a) conventional mapping was too slow, and (b) it did not and almost certainly could not represent all the variation present. The first problem could be addressed by physiographic mapping from air photography, which Philip and his team demonstrated with land-system atlases of Uganda, Swaziland and western Kenya. The second could be placed on a statistical footing so that predictions could be accompanied by assessments of uncertainty. That was the revolutionary spark, and it led to what we now know as pedometrics.

This new branch of research was developed by a series of doctoral students, who examined multivariate methods for soil classification and survey, logistics of soil survey procedures, remote sensing and soil information systems. Philip was also editor in chief of a series of twelve books, *Monographs on Soil Survey*, which was published by Oxford University Press between 1977 and 1986 and in which an international authorship wrote authoritatively about, inter alia, statistics, soil classification, land

¹ Beckett, P.H.T., Bie, S.W. 1972. Diminishing returns in research. *New Scientist*, 56, 517–519.

evaluation, soil description, geographical information systems and soil survey for forestry and engineering.

In the mid 1970s Philip turned his attention to the problems created when sewage sludge containing heavy metals is applied to land. He realized that the regulations then in place in different countries implied different mathematical forms for the joint effects of metals on the soil system: a set of ready-made hypotheses. Along with his students he also examined the critical concentrations of heavy metals in plant and animal tissue, and the chemistry of heavy metals in digesters, soil organic matter and the soil solution. A characteristic innovation, when computer graphics were still rudimentary, was a cube formed of layers of perspex, on which it was possible to plot a joint response surface to two variables for examination in three dimensions.

Although exchange processes, soil variability and heavy metals were the three principal themes of Philip's research they by no means exhaust his output. An article on Walther Penck's Aufbereitung concept, given a pedological interpretation, hints at ideas for developing a basic theory of soil in the landscape which has yet to be realized. He also wrote about the logistics of agricultural extension, yield variation, land values and the aesthetic appreciation of landscapes.

Philip Beckett retired in 1995. He was the last of the soil scientists *sensu stricto* in the university, and to mark the occasion he held in his college a wake attended by many of his former students and colleagues. We remember him with affection for his guidance early in our careers, his good humour, stimulating discussions and care for our well-being.

Murray Lark and Richard Webster



Philip in retirement.

In Memoriam Gerard (Jerry) Hendrik Bolt

(1925-2015)



Gerard (Jerry) Hendrik Bolt, emeritus professor of Soil Chemistry and Soil Physics at Wageningen University, died in the 90th year of his life, on 12 January 2015 in Nieuwegein, the Netherlands.

Jerry was born on 8 April 1925 in Arnhem, the Netherlands, where he also attended primary and secondary schools. In 1942 he graduated from the Lorentz Hogereburgerschool (H.B.S.-B), a type of secondary school strong in mathematics, physics, chemistry, biology and modern languages. In a 2011 essay and the 2014 Hotel de Wereld Liberation Lecture, Jerry described in detail the eight tumultuous World War II and post-war years, which led him to soil chemistry and physics. Soon after he started his studies at the Landbouwhogeschool (Agricultural University) in Wageningen, all Dutch universities came to a virtual standstill as a result

of the demand that staff members and students sign a pledge of loyalty to the German occupying forces. Jerry then switched to the Middelbare Koloniale Landbouwschool (Secondary Colonial Agricultural School) in Deventer. Simultaneously, he also got involved in the soil survey of the Bommelerwaard in the Rhine-Meuse delta, carried out by a group led by Professor C.H. Edelman. This contact initiated his interest in soil science. After graduating from the Deventer school in 1945, he was qualified to start a career at some plantation in the Dutch East Indies. But following the Proclamation of Indonesian Independence on 17 August 1945, he decided in early 1946 to return to the Landbouwhogeschool.

In Wageningen, contacts with his later colleagues Professors C.H. Edelman, W.R. van Wijk, and especially A.C. Schuffelen helped him to discover his real talents. After obtaining the degree of Landbouwkundig Ingenieur (Ir.-equivalent to a MSc) in 1950, he emigrated to the USA and started graduate study at the Agronomy Department of Cornell University. Just before he departed to the USA, Jerry married Irene de Klerk, who joined him at Cornell three months later, after she completed her Kandidaats (equivalent to BSc.) in chemistry at the Leiden University.

After Jerry's intended supervisor M.B. Russell left to become Head of the Department of Agronomy at the University of Illinois, the younger soil physicist Bob Miller and the soil physical-chemist Michael Peech became Jerry's supervisors. Moreover, R.K. Schofield of Rothamsted Experimental Station temporarily replaced Russell. Schofield's experience and interest in the application of diffuse double layer theory in soil science stimulated Jerry's choice of thesis projects for his MSc (1952) and PhD (1954). As postdoc, Jerry continued his research at Cornell for another year. Following that, for two years he was research chemist with DuPont Experimental Station at Wilmington, Delaware.



At the invitation of Professor Schuffelen to join him as Reader in Soil Science, Jerry returned to Wageningen Agricultural University in 1957. His inaugural lecture was entitled 'Adsorption equilibria in soil' (in Dutch). The Chair Groups of Professors Schuffelen and Edelman cooperated in setting up a new degree program in soil science. Jerry's general interest in reshaping university programs grew out of this and led to his intense involvement in debates and committees on this subject, both at Wageningen and nationally. Over the years he tirelessly advocated modernizing the structure of Dutch universities by adopting certain aspects of the American model. In his 1987 farewell lecture 'Afstand nemen' (literally 'Taking distance'), he looked back in detail at the evolution at Wageningen Agricultural University over the last forty years, as a place to study, teach and do research.

Jerry modernized the teaching programs in general soil physics and physical chemistry. In the period 1957-1961, I much enjoyed his teaching and advice. In the advanced courses we were exposed to up-to-date treatments of swelling of pure clays, ion exchange processes, and the mechanisms of retention and flow of water in unsaturated soils. His review papers 'Thermodynamics of soil moisture (1960)', with Martin Frissel, and 'Cation-exchange equations used in soil science - A review (1967)' brought welcome clarity for anyone interested in these rapidly developing subjects.

In 1963, Jerry was promoted to Professor. In his inaugural lecture entitled 'Differentiation and specialization in general soil science' (in Dutch), he presented his views on the divergent needs of research versus practical soil scientists. He stressed the need for research soil scientists to gain expertise in at least one basic subject, such as physics, chemistry, or mathematics. As Professor, Jerry was qualified to supervise doctoral dissertations, although as Reader he had already supervised the PhD thesis research of Martin Frissel. He supervised 15 PhD dissertations, of which 10 were based on research at the Agricultural University and 5 on results from agricultural research institutes. The dissertations ranged from a few on physical subjects, more on physico-chemical subjects, and a few on chemical subjects. For brief summaries of the dissertations, I refer to the article 'About Professor G.H. Bolt' by Frans de Haan and Hein ten Berge (Netherlands Journal of Agricultural Science 35: 212-218, 1987).

In the mid 1970ies, it appears that Jerry felt that from then onward his talents were more needed in soil chemistry. He left it largely to his staff to consolidate the course material on soil physics, which eventually in 1983 resulted in the textbook *Elements of soil physics* by P. Koorevaar, G. Menelik and C. Dirksen.

Jerry's views on soil chemistry reached a quite definite form in the two volumes *Soil Chemistry A. Basic elements* (1978, 2nd ed.), edited with M.G.M. Bruggenwert and B. Physico-chemical models (1982, 2nd ed.), edited alone. While all contributing authors are listed on the title pages, the editors made sure that the terminology, notation etc. were uniform. In fact the books could and probably still can serve as guidelines for a variety of courses, e.g. based on Jerry's chapters on theoretical aspects of adsorption/exchange chromatography in soil science (64 pages) or on electrochemical phenomena in soil and clay systems (46 pages). These two volumes reflect Jerry's achievements in soil chemistry as a true scholar and a superb teacher.

Jerry was very active in the international arena: Fulbright Scholar at the University of California at Riverside in the USA (1964); Pye Fellow and visiting scientist with the Commonwealth Scientific and Industrial Research Organization (CSIRO) at Canberra in Australia (1970); visiting professor at Technion, Haifa in Israel (1979).

The arrangement with M.B. Russell for Jerry's graduate studies at Cornell University came about at the 4th Congress of the International Society of Soil Science (ISSS) at Amsterdam in the summer of 1950. Ever since this fortunate contact, Jerry remained very actively involved in ISSS. He was President of Commission I (Soil Physics) in 1964-1968 and Commission II in 1986-1990, reflecting the shift of emphasis to predominantly soil chemistry.

Jerry Bolt was member of the ISSS Committee on Soil Physics Terminology that was formed at the 7th Congress at Madison WI, USA in 1960. The Committee focused on basic terms related to statics and dynamics of soil water that are also of interest to other sciences such as plant physiology and micrometeorology. The successive versions of the Committee report in ISSS Bulletin 20 (1962), 22 (1963) and 23 (1964) reflect the hot debates among the committee members and commentators. In 1973, the second Terminology Committee



was appointed, of which Jerry became the Chairman and I was one of the six members. The preliminary report was published in Bulletin 44 and discussed at the 10th ISSS Congress at Moscow in 1974. The final and final-final reports appeared in ISSS Bulletin 48 (1975) and 49 (1976). The main differences with the report of the first Committee are the coverage of swelling/shrinkage phenomena and the greater detail in the definitions of the terms. Jerry expertly handled the strong views of some Committee members and commentators, thus managing to keep the final report focused on the most important aspects.

Another major ISSS involvement stemmed from an ad-hoc ISSS Working Group that was set up at the 11th ISSS Congress in Edmonton, Canada in 1978 to focus on processes at surfaces of soil colloids. This resulted in a series of position papers 'Proposals for coordinated research on the nature and properties of soil colloid surfaces' published in ISSS Bulletin 60 (1981). At the 12th ISSS Congress at New Delhi in 1982, the position papers were accepted and Jerry Bolt became the Chairman of the official ISSS Working Group. This resulted in NATO-sponsored workshops at Ghent in 1984 and 1986, several small meetings, and eventually two books in the NATO ASI Series. Jerry served as first editor of the book *Interactions at the soil colloid-soil solution interface* (1991). With one of his co-editors, Michael Hayes, and one of his successors at Wageningen, Willem van Riemsdijk, Jerry wrote three of the seventeen chapters. These chapters reflect Jerry's keen interest in the history of soil physico-chemistry. Of course differences of opinion remained. I recall the heated discussion with his contemporaries Phil Low and James Quirk during the 1991 NATO workshop on clay swelling and expansive soils at Cornell University.

At the 15th Congress in Acapulco, Mexico in 1994 Jerry made his last contribution at an ISSS Congress with a historical review on soil acidity. The resulting paper 'Soil pH, an early diagnostic tool: its determination and interpretation' in *Advances in GeoEcology* (29: 177-210, 1997) reveals much of the often confused and divergent views within ISSS Commission II (Soil Chemistry) in the decades between World Wars I and II.

Jerry's students, colleagues, and friends will always remember his precise formulations, his generously sharing ideas, his stimulating influence, and

his great helpfulness. Personally I have very good memories of his advice and help in 1961 when I chose for graduate study in the USA. In the 1970-80s, the monthly meetings of the Working Group 'Transport and accumulation phenomena in connection with soil contamination', chaired by Jerry, provided a stimulating atmosphere for participants to share their latest findings and plans.

Not surprisingly, Jerry's contributions to soil science and educational infrastructure were widely appreciated: he was knighted in the Order of the Dutch Lion; elected Fellow of the Soil Science Society of America (1968); elected Honorary Member of the ISSS (1998); awarded an Honorary Doctoral Degree by the University of Guelph in Canada (2000).

Jerry is survived by his wife Irene, their three children with partners, and four grandchildren. Later this year he would have turned 90 and would have been married to Irene for 65 years. Ten years ago they moved from Wageningen to Zeist, close to their children and grandchildren. There they remained self-reliant as much as possible, enjoying their common love for classical music. In recent years, Jerry's interests kept widening, encompassing areas such as the functioning of our brain, and the latest theories in physics and astronomy. On Saturday 17 January 2015, his family paid tribute to him with moving speeches and live classical music, in the presence of friends, students, and colleagues.

Peter Raats

In Memoriam Otto Spaargaren

(1944-2015)

Otto Spaargaren passed away at Bennekom on March 13th 2015 at the age of 71.

Everybody will remember Otto as the winner of the third IUSS Guy Smith Award with which the IUSS community recognized him for his major contributions to international soil classification and correlation with special reference to the World Reference Base for Soil Resources (WRB).

Otto started his professional career as Educational Officer at the International Soil Museum (now ISRIC – World Soil Information), Wageningen from where he undertook numerous soils projects all over the world: soil survey for rice production in the Niger Delta in Nigeria; soil survey for the Mahaweli Development Project in Eastern Sri Lanka; feasibility for irrigation in Western Nepal. Otto also spent numerous years overseas in various projects



such as the Soil Survey of Zambia and Coordinating the African Acid Soils Network of the International Board for Soil Research and Management (IBSRAM). Otto spearheaded under FAO the first classification system for top soils in the world and was involved in the work on Land Quality Indicators (LQI) under the authority from the World Bank. From 2006 to 2010 he was the Chair of the IUSS Working Group WRB and from its foundation till 2006 he served as Vice-Chair and Secretary of the Working Group.

Otto was a soil classifier in heart and soul. His contribution to international soil classification may be defined as designing and checking its architecture (and controlling its rules). The other dimension in Otto's approach was harmony both within one system and among systems. In Otto's world of soil classification, WRB has its unique place which he iconized as "umbrella between equally worthy national soil classification systems". With his concern to come to harmonization with Soil Taxonomy, Otto made numerous moves with the definitions of the diagnostics in WRB, so as to bring WRB and Soil Taxonomy closer to each other.

Otto's enthusiasm for soilscapes has inspired many young soil scientists. He really was a master in animating the discussions in the profile pits and then bringing the floating ideas towards a consensus by projecting them on his vast field experience. Not only that, during numerous field excursions in the margin of international soil congresses, Otto would sneak out to collect numerous soil monoliths which are now on display in the soil museum at ISRIC and at the places of origin. In the quietness of the magnificently refurbished International Soil Museum at ISRIC, Wageningen, The Netherlands, Otto Spaargaren will always remain present through the numerous soil monoliths which will continue inspiring people from around the world in eternity.

*Jozef (Seppe) Deckers, KU Leuven
Belgium*

IUSS Honorary members

Year	Member	Country	Year	Member	Country
1924	L. Cayeux †	France	1986	E.W. Russell †	UK
	K. Glinka †	USSR		H. Jenny †	USA
	Jos. Kopecky †	Czechoslovakia		D. Kirkham †	USA
	G. Murgoci †	Romania		S.K. Mukherjee †	India
	E. Ramann †	Germany		R. Tavernier †	Belgium
	Sir John Russell †	UK		1990	G. Aubert †
S. Winogradski †	USSR	E.G. Hallsworth †	Australia		
1927	P. Treitz †	Hungary	J.S. Kanwar	India	
1935	E.A. Mitscherlich †	Germany	P. Schachtschabel †	Germany	
	A. d'Sigmond †	Hungary	R.W. Simonson †	USA	
	J. Stoklasa †	Czechoslovakia	I. Szabolcs †	Hungary	
	G. Wiegner †	Switzerland	1998	G.H. Bolt †	Netherlands
1950	A. Demolon †	France		R. Dudal †	Belgium
	D.J. Hissink †	Netherlands	K.H. Hartge †	Germany	
	W.P. Kelley †	USA	M. Kutilek	Czech Rep.	
1954	S. Mattson †	Sweden	J. Quirk	Australia	
	E. Truog †	USA	W.G. Sombroek †	Netherlands	
1956	G. Bertrand †	France	K. Wada	Japan	
	E.C.J. Mohr †	Netherlands	D.H. Yaalon †	Israel	
1960	F.A. Bear †	USA	S.V. Zonn †	Russia	
1964	J.A. Prescott †	Australia	2002	R.W. Arnold	USA
	1968	F. Hardy †		UK	G.V. Dobrovolsky †
W.L. Kubiena †		Germany	W. Gardner †	USA	
L.A. Richards †		USA	H.M. Hamdi †	Egypt	
A.A. Rode †		USSR	L.A.L. Sarmiento	Colombia	
1974		R. Bradfield †	USA	F. Mancini	Italy
	G.V. Jacks †	UK	B.S. Nosko	Ukraine	
	Ch.E. Kellogg †	USA	R. Rosell	Argentina	
	M.K. Kononova †	USSR	A. Ruellan †	France	
	A. Oudin †	France	A. Tanaka	Japan	
1978	F. Scheffer †	Germany	P.B.H Tinker	UK	
	G. Barbier †	France	2006	W.E.H. Blum	Austria
	V. Ignatieff †	Canada		H-P. Blume	Germany
	Y. Ishizuka †	Japan	J. Bouma	Netherlands	
	L. Krolkowski †	Poland	S-J. Cho †	S Korea	
L. Vettori †	Brazil	J. Glinski	Poland		
1982	Ph. Duchaufour †	France	M.G.H. Jamagne	France	
	W. Flaig †	Germany	D.R. Nielsen	USA	
	V. Kovda †	USSR	J.H.V. van Baren †	Netherlands	
	E. Mueckenhausen †	Germany	L.P. Wilding	USA	

IUSS Honorary members (Continued)

Year	Member	Country
2010	C. Feller	France
	K. Kumazawa	Japan
	K. Kyuma	Japan
	J. Ryan	Syria
	B.A. Stewart	USA
	V. Targulian	Russia
	G. Varallyay	Hungary
J.S.P. Yadav †	India	

Year	Member	Country
2014	J.J. Kim	Korea
	J.M. Kimble	USA
	A.R. Mermut	Canada
	N. Senesi	Italy
	D.L. Sparks	USA
R.E. White	Australia	

IUSS Award Winners

Year	Dokuchaev Award	Country
2006	Victor Targulian	Russia
2010	Dan Yaalon	Israel
2014	Alex McBratney	Australia

Year	Von Liebig Award	Country
2006	Rattan Lal	USA
2010	Don Sparks	USA
2014	Magdi Selim	USA



