# IUSS Bulletin

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## 2015 International Year of Soils

## 127

# International Union of Soil Sciences (IUSS)

The IUSS Bulletin is the official Newsletter of the International Union of Soil Sciences.
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2015 International Year of Soils


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# IUSS reports

## Report from the IUSS Secretariat

### IUSS Secretariat

During the second half of 2015, the International Year of Soils, the Secretariat was mainly concerned with preparing the conference "Celebration of International Year of Soils 2015 – Achievements and Future Challenges", which took place at IAEA/Vienna International Centre, Austria, December 7, 2015. The IUSS together with the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture organized this conference to celebrate the International Year of Soils (IYS) together with the World Soil Day (WSD).

### IUSS website

During the International Year of Soils 2015 contributions to the IUSS website were mainly provided by the IUSS Divisions, Commissions and Working Groups as well as the national soil science societies who gave an account of their various activities. For details the reader is referred to the following chapters. During 2015 the number of direct hits to the website has steadily increased and we would like to take this opportunity to thank everybody who has contributed to this success for their effort.

### 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.

In 2015 all available funds were disbursed, and used for a wide range of activities, e.g. helping finance the editing of the Commission 1.1 Newsletter on Soil Morphology and Micromorphology, and contributing to the following meetings: Prague Meeting "Ecology of Soil Microorganisms"; Dan Yaalon Symposium (Vienna, Austria); Pedometrics Conference 2015 (Cordoba, Spain); Commission 1.6 Paleopedology workshop "Soils and Paleosols of Brazil" (Campinas/Cananéia); International Field Course and Soil Judging Contest (Hungary); Sustainable Soil Management Symposium in South Africa; and invitation of three speakers to the Conference "Enzymes in the Environment" in Wales.

We would like to remind those who have not already done so that a short (500-1000 words) report of the activity for which the funds were received, must be presented for inclusion in the IUSS Bulletin within 2 months of completion.

## Honorary doctorates

### Honorary doctorate at Dresden University, Germany, for IUSS President Elect Prof. Rattan Lal

At an emotional ceremony on September 23, 2015, Prof. Rattan Lal (Ohio State University) was awarded an Honorary Doctorate degree at Technische Universität Dresden (TUD, Dresden University of Technology) by the Rector, Professor Hans Müller-Steinhagen, and the Dean of the Faculty of Environmental Sciences, Professor Karl-Heinz Feger. TUD is one of 11 universities in Germany recently identified as an »excellence university«.

*"With the granting of this honorary doctorate, our university honors one of the world's most famous and globally engaged soil scientists. His research topics and spheres of activities go far beyond soil science. Of global importance are Dr. Lal's seminal and often cited publications on the potential for carbon storage in soils connected with global change, food security in a world with growing human population, as well sustainable and integrated management of soil and water resources. Moreover, we honor a person not only of high international standing, but also with a unique and charismatic personality"*, said Feger, who also heads TUD's »Institute of Soil Science and Site Ecology«.

*Professor Rattan Lal after receiving the Honorary Doctorate certificate from the Rector, Hans Müller-Steinhagen (right), and the Dean of the Faculty of Environmental Sciences, Karl-Heinz Feger (second right). To the right of the new honoree doctor stand Dr. David M. Malone, Rector of the United Nations University, and Professor Klaus Töpfer. Photo: Gerlach*

The laudation was held by Professor Klaus Töpfer, the former German Federal Minister for the Environment and former Executive Director of the Environmental Program of the United Nations (UNEP). Töpfer emphasized Dr. Lal's academic merits, but also his special role in the dialogue between politics and science on the topic of sustainability. During his roughly four decades of professional activity, Lal has worked at institutions in nearly all continents. Therefore, he is a true »world citizen«. For his outstanding achievements, he has received several honorary doctorate degrees and other awards worldwide. Professor Lal has headed a number of different panels and scientific societies, including serving as president of the »Soil Science Society of America« and the »World Association of Soil and Water Conservation«. Moreover, he has contributed substantially to the »Intergovernmental Panel on Climate Change (IPCC)« as well as to the »UN Millennium Assessment«. In Germany, Professor Lal was appointed, by Klaus Töpfer, as a science advisor for the »Institute for Advanced Sustainability Studies (IASS)« in Potsdam. In this position he has been actively engaged in the »Global Soil Week«, a worldwide recognized platform which was held this year for the 3rd time in Berlin.

Dresden in particular has benefited from engagement with the Ohio State professor. *"Rattan Lal has contributed significantly to the establishment of a close partnership between the TUD and the United Nations University (UNU), which has been based in Dresden since 2012 with its »Institute for Integrated Management of Material Fluxes and Resources (UNU-FLORES)«. Dr. Lal provided crucial impetus for the constitution of a joint doctoral program with TUD, and was one of the architects of the international »Dresden Nexus Conference« series"*, the two Rectors, Hans Müller-Steinhagen (TUD) and David M. Malone (UNU, Tokyo) jointly affirmed.

*By Carsten Brackhage*


UNIVERSITAS TIMISIENSIS SCIENTIARUM AGRICOLARIUM
ET MEDICINAE VETERINARIAE BANATICA
„REX MICHAEL I ROMANIAE"

Professor universitarius Doctor

Rainer Horn

DECLARATUR

DOCTOR HONORIS CAUSA

PRO EXCELSIS MERITIS IN ROMANIAE DISCIPLINAE ACADEMICAE AUGMENTO
ET IN RELATIONES CONSOLIDANDO INTER UNIVERSITATEM NOSTRAM
ET UNIVERSITATEM AB KIELE.

RECTOR UNIVERSITATIS
PAUL FĂRŞAN

PRAESES SENATUS UNIVERSITATIS
GHEORGHE DAVID

### Honorary Doctorate for IUSS President Prof. Rainer Horn

IUSS President, Prof. Rainer Horn, received a Honorary Doctorate from the Faculty of Agriculture of the Banat University of Agricultural Sciences and Veterinary Medicine in conjunction with the Romanian National Society of Soil Science on 23-24 November 2015.

## Report of Division 1: 'Soil in Space and Time'

*by Erika Michéli, Division Chair*

The complete report of Division 1 can be found in section 2015 International Year of Soils, chapter "Activities of IUSS Divisions and Commissions for IYS".

## Report of Division 2: 'Soil properties and processes'

*by Kazuyuki Inubushi, Division Chair*

A detailed account of the activities of IUSS Division 2 for IYS can be found in chapter "Activities of IUSS Divisions and Commissions for IYS").

Main activities of Division 2 was to organize one Inter-Divisional Symposium (Critical issue of radionuclide behaviours in soils and remediation) and 2 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 *Biophysical 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*

As part of the endeavour to strengthen ties with other fora such as the European Geosciences Union (EGU), contact was established with Dr. Saskia Keesstra, Chair of the EGU Soil System Science Division. During the EGU General Assembly in Vienna, Austria 12 -17 April 2015, the Soil Chemistry Commission explicitly endorsed 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". In addition, ties were further strengthened by participation in the Wageningen Soil Conference, Wageningen, The Netherlands, 23-27 August 2015 as well as the 5th International Symposium on Soil Organic Matter in Göttingen, Germany, 20-24 September 2015. In addition, there were numerous individual contributions of fellow scientists working in the field of Soil Chemistry. The Soil Chemistry Commission likes to use this opportunity to thank everybody who through their endeavours is helping to support and strengthen the field of Soil Chemistry, in particular young scientists.

## Report of Commission 2.3 Soil Biology

*by Ellen Kandeler, Commission Chair*

The 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 2th 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 the 29th of November to the 3th of December 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 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, 7-10 July 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 3: "Soil use and management"

*by Takashi Kosaki, Division Chair; Ivan Vasenev, Commission 3.1 Chair; Scot Chang and Toru Fujiwara, Commission 3.3 Chair and Vice-chair; Bin Zhang, Commission 3.4 Chair; Jaume Bech, Commission 3.5 Chair; Bal Ram Singh, Working Group Land Degradation Chair; Mizuhiko Nishida, Working Group Paddy Soils Chair*

Division 3 is always working with Commission 3.1 through 3.6 and very closely collaborating with Working Groups such as "Land Degradation", "Soils of Urban, Industrial, Traffic, Mining and Military Areas (SUITMA)" and "Paddy Soils". Since it was the International Year of Soils in 2015, the division has worked not only within the soils community but also tried to collaborate with those who are mainly involved in related disciplines, e.g. Quaternary Research, Biogeochemistry, Biotechnology, Geotechnics, Civil Engineering and others to exchange ideas, share new methodologies and findings and discuss the goal of constructing a sustainable society. The following were the major activities organized by the division together with the relevant commissions, working groups and colleagues from related disciplines.

1) The 13th International Conference on the Biogeochemistry of Trace Elements (ICOBTE), July 12-16, 2015, in Fukuoka, Japan. The division organized the symposium on "Remediation of heavy metals-contaminated soils: Novel practical approach based on state-of-the-art science" together with Commission 3.3 as well as the one on "Application of synchrotron radiation (SR)-based methods to biogeochemistry and environmental geochemistry of trace elements". Both symposiums were supported by the National Institute for Agro-Environmental Sciences, Japan.

2) The 19th International Union for Quaternary Research (INQUA) Congress, July 26-August 2, 2015, in Nagoya, Japan. The division held the session

"Biosphere contaminated with artificial and natural radionuclides" together with Japanese Society of Soil Science and Plant Nutrition and convened a joint session "Urban soil development" with WG SUITMA and Tokyo Metropolitan University, Japan.

3) The 12th East and Southeast Asia Federation of Soil Science Societies (ESAFS) Conference, September 18-21, 2015, Nanjing, China. The division held the symposiums on "High yield of rice and sustainable soil utilization" with WG Paddy Soils.

4) The International Congress on the Occasion of the International Year of Soils 2015 (Soil Functions and Climate Change – do we underestimate the consequences of new disequilibria in soil properties - SUSTAIN), September 23-16, 2015, in Kiel, Germany. The division co-convened "Special Symposium: Plant nutrition research for future sustainable agriculture" with Commission 3.3 and "Special Symposium: Soil degradation – impact on soil quality, productivity and climate change" with Working Group Land Degradation.

5) The 28th Bi-Annual Conference of the Soil Science Society of East Africa (SSSEA) and African Celebration Meeting of the International Year of Soil, November 23-27, 2015, in Morogoro, Tanzania. The division held a symposium on "Sustainable soil productivity in tropical Africa ~ nutrient stock and flow~".

6) The division jointly published "Soils of Anthropized Environment" as a supplementary issue of Soil Science and Plant Nutrition (Vol. 61(S1), 2015) including selected papers related to the 7th International Conference of SUITMA held on September 16-20, 2013, in Toruń, Poland. Additionally, those selected from The Conference on Desertification and Land Degradation held on June 17-18, 2013, in Gent, Belgium, were published as a special section of the above journal (Vol. 61(3), 2015). Publication of both volumes was financially supported by Tokyo Metropolitan University, Japan.

## Report of Commission 3.1 Soil Evaluation and Land Use Planning

*by Ivan Vasenev, Commission Chair*

During the General Assembly of the European Geosciences Union (EGU-2015, Vienna, April 13-17) the commission organized the sessions SSS10.2 "Soil environmental functions and land quality evaluation for land-use optimization". During May 18-22 the 7th Congress of European Society of Soil Conservation (ESSC) was held in Moscow, where the commission organized under the umbrella of ESSC, Dokuchaev Soil Science Society and the commission convened the symposium on "Soil Evaluation and Land Use Planning", which included 2 plenary and 12 scientific sessions and 1 field trip to a representative area of Central Russia agro-landscapes with different types of Podzoluvisols and land-use practices.

## Report of Commission 3.3 Soil Fertility and Plant Nutrition

*by Scot Chang, Commission Chair*

In addition to the above symposiums co-convened with Division 3, the commission was involved in the 2nd International Symposium on Forest Soils held in Fuzhou, China and delivered an invited talk on some aspects of soil fertility/plant nutrition in reclaimed/reconstructed soils/ecosystems. The papers are expected to be published on Soils and Plant in the near future.

## Report of Commission 3.4 Soil Engineering and Technology

*By Bin Zhang, Commission Chair*

The commission was involved in the "High Level Forum on Sustainable Use and Protection of Mollisols in China" held during Sept 7-9, 2015, in Harbin and the "Sino-German Symposium on Soil Science and Soil Protection" held in Beijing during September 17-19, 2015, in celebration of the 2015 International Year of Soils.

## Report of Commission 3.5 Soil Degradation Control, Remediation and Reclamation

*by Jaume Bech, Commission Chair*

During the General Assembly of the European Geosciences Union (EGU-2015, Vienna, April 13-17), the commission organized the session SSS8.3. "Remediation of polluted soils" in which 17 oral and 30 poster papers were presented. The commission is now preparing for EGU-2016 with a possible topic of the symposium on "Reclamation and management of polluted soils: options and case studies" and for EUROSOIL 2016 with a symposium on "Detection, Risk Assessment and Remediation of Polluted Soils from Mining and Smelting Areas".

The commission has also worked for the publication of "Soil Pollution and Remediation" as a special issue of the Journal of Soils and Sediments and of "Reclamation of Mining Site Soil" as the one of CATENA, which shall be distributed shortly.

### Report of Working Group Land Degradation

*by Bal Ram Singh, Working Group Chair*

In addition to the activities with Division 3 listed above, the working group collaborated with Sokoine University of Agriculture, Tanzania, USAID, the Ohio State University and Innovative Agricultural Research Initiative to hold an international conference "Climate Change and Multi-Dimensional Sustainability in African Agriculture" and chaired the plenary session "Multi-dimensional sustainability".

### Report of Working Group Soils of Urban, Industrial, Traffic, Mining and Military Areas (SUITMA)

*by Jean Louis Morrel, Past Chair*

In addition to the activities with Division 3 listed above, the working group organized the 8th International Conference of the Working Group on Soils in Urban, Industrial, Traffic and Mining Areas (SUITMA) in Mexico-city on September 20-25, 2015. Selected papers are supposed to be published as a special issue of Soils and Sediments. The next conference shall be in Russia in 2017. Jean Louis Morrel, France, was replaced by new chair, Kye-Hoon John Kim, Korea.

### Report of Working Group Paddy Soils

*by Mizuhiko Nishida, Working Group Chair*

In addition to the activities listed above with Division 3, Mizuhiko Nishida, Japan, replaced Ho Ando, Japan, as Chair of the working group.

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

*by Christian Feller, Division Chair*

### Division 4 presentation

The Role of Soils in Sustaining Society and the Environment

Division 4 is generalized and entails the transfer and outreach of our knowledge base to segments of our society where soils and soil science are frequently misunderstood or sometimes under appreciated. It takes the soils information generated in the other three divisions along with developing new scientific information and addresses public literacy in soil science, education, international conventions, consequences of human activities on soil ecosystems, policy issues, food security, history of the discipline, etc. This division might be considered the "capstone" division because it must integrate our scientific body of knowledge so scientists, policy makers, and those specialists remote to soil science may become more informed about the utility of this most essential natural resource at the Earth's surface. It is the scientific entity that interacts well beyond traditional bounds.

Division 4 is organized in five commissions:

- Commission 4.1 - Soils and the Environment
- Commission 4.2 - Soils, Food Security and Human Health
- Commission 4.3 - Soils and Land Use Change
- Commission 4.4 - Soil Education and Public Awareness
- Commission 4.5 - History, Philosophy, and Sociology of Soil Science

During 2015, the International Years of Soils (IYS), Division 4 has carried out a number of different activities to raise awareness of soils. For a detailed account of these activities, which included the publication of the Division 4 newsletter "*Soil Connects*", weekly articles on the IUSS website and the participation in local, national and international seminars, symposium conferences and exhibitions, the reader is kindly referred to the Chapter on the International Year of Soils.

# Report of Working Group on Digital Soil Morphometrics

*by Pierre Roudier*

The inaugural Global Workshop on Digital Soil Morphometrics was held in Madison (Wisconsin, USA), from the 1st to the 4th June 2015. The event, organised locally by Alfred Hartemink and Budiman Minasny at the wonderful University of Wisconsin campus. The workshop was held in the frame of the International Year of Soil, and run under the auspices of the International Union of Soil Science (IUSS) --- in particular of the Working Group on Digital Soil Morphometrics which is led by Alfred. This Working Group is the most recent one within the IUSS, and it is great to see that despite being still at an emerging state, this group is extremely dynamic and energetic.

Digital Soil Morphometrics (Alex McBratney suggested the acronym "DSMorph" to mark the distinction with Digital Soil Mapping) is a relatively newcomer in the soil science world, and has been formalised by Alfred and Budiman in their seminal 2014 paper (Hartemink and Minasny, 2014). It is defined as "the application of tools and techniques for measuring, mapping and quantifying soil profile attributes and deriving continuous depth functions". It is acknowledging the emergence of new tools and quantitative techniques that can be used in soil profile descriptions - a domain where techniques and toolkits have been quite stable for the past 60 years.

The workshop certainly was a great illustration of the dynamism of this emerging discipline. Around 70 participants from all around the world converged to Madison: Africa (Tanzania), Asia, (Taiwan), Europe (Belgium, Germany, Hungary, UK), North America (USA, Canada), Oceania (Australia, New Zealand), and South America (Brazil). 35 oral presentations, in addition to 7 keynote presentations, were given over two and a half days on the campus. But of course, that was after the very first day of the workshop, which very fittingly was spent in the field. Led by Birl Lowery, with the support of the other colleagues from the University of Madison, we had a fantastic tour of the diverse landscapes - and soilscapes - of Wisconsin. The first stop was at the West Madison Agricultural Research Station, where we had the opportunity to appreciate (and quantify!) the variety of soils that can occur at quite a short scale: 2 soil pits were dug about 50 meters apart. The large width of exposed soil was also a good reminder of the short-scale, horizontal variations that occur when sampling soils. The second stop was on a farm in the Central Sands region. After a well-earned lunch stop, we had the opportunity to inspect the soil pits using a variety of sensors: portable XRF, portable Vis-NIR, penetrometer... completing of course the more traditional tools of the pedologist. The final stop of the day was at Devil's Lake State Park, where everyone enjoyed the local brews and cheeses that make the pride of Wisconsin, followed by a very scenic walk to wash these down.

Back on the University Campus, day 2 started with a keynote from Alex McBratney, who kicked off the Workshop with an introductory perspective to Digital Soil Morphometrics. The Workshop was split into a range of thematic sessions, spanned over 2 and a half days:

- Prediction of soil properties on the soil profile itself
- Imaging techniques on the soil profile
- Soil depth functions
- The role of Digital Soil Morphometrics in Digital Soil Mapping (DSMorph for DSM!)

*Group photo.*

*Jenna Grauer-Gray demonstrating the use of a portable XRF spectrometer on a soil profile during the field trip.*

Amongst the keynote presentations, the presentations of Erika Michéli and Jon Hempel, who are both involved in the Universal Soil Classification, did a very good job at putting the workshop in perspective with the latest developments in soil classification techniques. Erika and Jon demonstrated how Digital Soil Morphometrics techniques are central, through the concept of depth functions, to the emerging Universal Soil Classification system, and to a variety of other soil information products. The question of how to derive such depth functions was at the core of Budiman Minasny's keynote talk: Budi mentioned in particular the role of high resolution scans of the soil profile to do so. The development of the concept of depth functions for soil classification is also generating the need to create a collaborative depth functions library.

A range of presentations gave an overview of the sensing techniques that can be useful in Digital Soil Morphometrics. Daniel Hirmas and Brian Slater, for example, showed interesting approaches to capture the profile's surface variations at very high resolution, and derive a variety of indicators related to soil structure and soil texture. In his keynote, Markus Steffens also demonstrated the use of a hyperspectral camera on the surface of soil profiles, allowing to derive predictions of soil attributes at a very fine scale. Taking a different approach, another interesting keynote was provided by Matt Aitkenhead: Matt showed how a simple digital camera from a smartphone can be combined with environmental data to put soil organic carbon estimates directly in the hands of the farmer or casual user. Different users, different technologies, and different techniques. Darrell Schulze presented a very promising approach to the visualisation of soil structure using computer graphics, and procedural modelling. While Darrell's project is focusing on the visualisation of soil structure, several of us noted that those tools could be investigated to measure soil structure. Finally, Jose Dematte's presentations underlined the value of these tools as a data provider for digital soil mapping products.

The Workshop concluded on an excellent discussion session led by Alex McBratney, and concluded by Alfred Hartemink, who announced that the next Workshop on Digital Soil Morphometrics will be organised in Aberdeen (Scotland) by Matt Aitkenhead and his team at the James Hutton Institute. In the light of the week of discussion in Wisconsin, and I certainly hope to be able to take part in the next workshop.

Finally, I would address a warm word of congratulations to Alfred and Budiman for the organisation and leadership: I think the Workshop was a great success, and I very much enjoyed every aspect of it. I also want to thank and congratulate the very helpful team from the Department of Soil Science who helped organise and run the conference (Birl Lowery, Bill Bland, Jenna Grauer-Gray, Jenifer Yost, Kabindra Adhikari, Luis Reyes-Rojas, and Benito Bonfatti).

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# 2015 International Year of Soils

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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 Message on account of the International Year of Soils

**In December 2013 the United Nations Organisation designated 2015 the 'International Year of Soils'** - the culmination of an initiative started back in 2002 by the International Union Soil Sciences (IUSS). His Majesty King Bumibhol of Thailand gave the initiative his support and, in April 2012, his government submitted an official proposal for an International Day of the Soil to the FAO Council for their support at the UN General Assembly in New York. In December 2013, the United Nations not only inaugurated World Soil Day, but declared 2015 the **International Year of Soils**.

This declaration will help increase worldwide public awareness of the highly sensitive topic of soils and their very specific properties - but also their irreversible vulnerability to mismanagement - and can help improve our handling of soils in the future. By 2050, the global population is projected to exceed 9 billion people. While the population rapidly increases, the available surface area of soil in which the food is grown to feed them diminishes at a rate of 300 square kilometres each day.

Soils are the most complex biomaterials on the planet. They are, effectively, self-regulating biological factories. Soils are 3-dimensional bodies on the earth's surface with liquid, gaseous and solid components. They contain both organic and inorganic materials, including living organisms in great number and diversity. These soils must be used carefully and in accordance with their resilience and elasticity, in order to ensure the long-term maintenance of their key properties and processes - and thus to meet the demands of a growing world population.

At present, the vulnerability of soils to global change and anthropogenic impact is unprecedented. Severe degradation, including widespread contamination, compaction, accelerated erosion, severe depletion of carbon and nutrients, rapid urbanisation and frequent hazards all threaten sustainable food production, adequate water supply, global ecosystem services and the essential quality of human life.

Soil carbon sequestration, soil restoration, the conservation of biodiversity and other important soil functions are important for sustainable land and soil use. Through land misuse and soil mismanagement, soils have been severely and increasingly degraded and some irretrievably lost. Soil degradation constitutes the most insidious and underestimated challenge of the 21st century, a challenge it is essential we meet and conquer.
The United Nations' decision to inaugurate 2015 as International Year of Soils is an important step in raising public awareness. But public concern alone is not sufficient to protect soils and ensure their sustainable use. Every country around the world needs to take and to maintain action.

During 2015, a number of activities were organised by national soil science societies in Cuba, Nigeria, Brazil, Costa Rica, Germany, Honduras, Japan, Poland, Romania, South Korea, Thailand, United Kingdom, Uruguay and Venezuela, to name just a few. Regional soil science societies such as ESAFS, the GSW in Berlin, the Soil Governance conference in Brasilia, participation in fairs like Green week in Berlin, the IFOAM meeting in Amsterdam and numerous IUSS conferences like in Texas, Goettingen or the SUSTAIN conference in Kiel all underline the enthusiastic engagement of soil scientists worldwide to help improve the visibility of soils and to explain their properties and functions, but also their vulnerability.

We are profoundly grateful for all your activities. Please continue during the period following the end of 2015. The International decade of Soils shall be the next challenge which will also bring us straight into the centennial anniversary of IUSS which will be celebrated in 2024 in Italy. We must remain at the forefront of the scientific agenda, on the agenda of policy makers and in public consciousness.

As a topic, soil must be accorded the importance it deserves.

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

## Celebration of International Year of Soils 2015 – Achievements and Future Challenges

IAEA/Vienna International Centre, Austria, December 7, 2015.
The IUSS together with the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture organized 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 partners were invited to discuss the achievements of the IYS and the future challenges in soil science as well as opportunities for international cooperation.
In the course of this highly successful event, which attracted more than 120 participants from all over the world, a draft version of the Vienna Soil Declaration "Soil matters for humans and ecosystems" was adopted and the International Decade of Soils (2015-2024) proclaimed by Rainer Horn, IUSS President. The end of the International Decade of Soils coincides with the centennial anniversary of the International Union of Soil Sciences.

*Lee Heng and Rainer Horn holding a ball showing the diversity of soils on our planet (©Sigbert Huber).*


# Celebration of the 2015 International Year of Soils

## Achievements and Future Challenges

### 7 December 2015

IAEA, Vienna International Centre, Austria
Room C1, C Building, 2nd Floor

2015 International Year of Soils

Organized in cooperation with the Food and Agriculture Organization of the United Nations and the International Atomic Energy Agency

Sponsored by

Die Österreichische Hagelversicherung

Umwelt-Geräte-Technik GmbH UGT

# Programme

**08:00 – 08:45 Security check and Registration**

Chair: Lee Heng, Head of Soil and Water Management & Crop Nutrition Section, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture

**09:00 Welcome addresses**
Aldo Malavasi, Deputy Director General IAEA, Dep. of Nuclear Sciences and Applications
Moujahed Achouri, Director Land and Water Division, FAO
Christian Holzer, Director General, Austrian Ministry of Agriculture and Environment

**09:20 Opening addresses**
Rainer Horn, IUSS President

**09:25 Honorary address**
Sathaporn Jaiarree, Director of the Office of Soil Resources Survey and Research, Land Development Department, Thailand

**09:50 Impact statements**
Hamid Marah, Director of Studies and Scientific Research, CNESTEN, Morocco
Alain Vidal, Director of Strategic Partnerships, CGIAR

**10:10** ***Coffee break (parallel to press note)***

Chair: Jae Yang, IUSS Past President

**10:40 International Year of Soils – achievement reports**
Rainer Horn, IUSS President
Carolyn Olson, Soil Science Society of America
Ahmed Mermut, European Confederation of Soil Science Societies
Takashi Kosaki, East and Southeast Asia Federation of Soil Sciences
Mónica Barbazán, Latin American Soil Science Society
Mamadou Traore, Africa Soil Science Society
Ian Hollingsworth, Soil Science Australia

**12:00 Future challenges**
Lee Heng, Head of Soil and Water Management & Crop Nutrition Section, Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, IAEA
Panos Panagos, Joint Research Centre, European Commission
Kurt Weinberger, CEO Austrian Crop Insurance Company

**12:30** ***Lunch break (Cafeteria, Vienna International Centre)***

Chair: Rattan Lal, IUSS President Elect

**13:30 Workshop on future challenges in Soil Science**
Introduction
Parallel working groups related to IUSS Divisions 1 – 4 and international cooperation
Working group deliberations and draft recommendations

**15:30** ***Coffee break***

**16:00 Workshop on future challenges in Soil Science (contd.)**
Presentation of working group recommendations
Discussion

**17:00 Closing Statement**
Rainer Horn, IUSS President

**17:10** ***Farewell Reception until 19:00***

*Programme of the conference.*

*Sathaporn Jaiarree, Christian Holzer, Moujahed Achouri, Aldo Malavasi, Lee Heng, Rainer Horn, Hamid Marah (from left to right, ©Sigbert Huber).*

*Winfried Blum, Rainer Horn, Kurt Weinberger, Karl Kienzl, Sigbert Huber (from left to right, ©Sigbert Huber).*

*In the course of this conference the Vienna Soil Declaration "Soil matter for humans and ecosystems" was adopted by all participants and was approved by FAO and IAEA thereafter (see below).*



## Vienna Soil Declaration
## "Soil matters for humans and ecosystems"

Proclaimed at the Celebration of the International Year of Soils 2015
Achievements and Future Challenges
December 7, 2015
Vienna, Austria

The World's highly diverse and dynamic soils provide numerous functions and services required by humans and are essential to most aspects of our lives. As the umbrella organisation of more than 60,000 soil scientists, the International Union of Soil Science (IUSS) in cooperation with the Food and Agriculture Organisation of the United Nations (FAO) and the International Atomic Energy Agency (IAEA) has organised the International Year of Soil (IYS) Celebration event "Achievements and Future Challenges", held on December 7, 2015 in Vienna. The participants of the IYS celebration event hereby declare:

- Soil is the environmental keystone, and the basis for microbial, plant and animal life,
- Soil is a major reservoir of biodiversity, antibiotics for human health and a gene reserve,
- Soil filters water, critical for supplying drinking water and other water resources,
- Soil stores water for the use by plants and acts as a buffer to prevent rapid run off,
- Soil stores and releases plant nutrients and is able to transform many compounds including pollutants,
- Soil is the basis for most of the food produced globally,
- Soil is necessary for the production of biomass such as wood, fibre and energy crops,
- Soil captures carbon and can help mitigate climate change,
- Soil is a finite resource and is essentially non-renewable over a human generational time scale,
- Soil has been used productively and often impacted adversely by humans for millennia.

The importance of soil must be further emphasized. Thus, at the end of the IYS, we recommend the following for the future:

1. Relationships between human activities and soils and their effects on other components of the environment in particular on the landscape level should be a major focus of soil science in collaboration with allied sciences, but also with social, legal, economic and cultural disciplines.
2. Soil security should be a key topic tied to food and water security and the achievement of the UN Sustainable Development Goals.
3. As a major carbon pool of the globe, soil should be considered a key component to help mitigate climate change by including sustainable soil management as a solution for the implementation of mitigation actions under the renewed international framework on climate change.
4. Whenever possible, the urbanisation and sealing of soils should be limited to avoid losses of vast areas of the best agricultural soils and soil degradation processes such as soil erosion, soil compaction, nutrients depletion, salinization, soil pollution and loss of soil biodiversity should be avoided as much as possible by proper soil management.
5. Soil awareness should be enhanced throughout the global community at all levels emphasizing soil functions and services, soil protection as well as sustainable soil management for a more resilient future at all landscape scales.

# 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.

## *Activities of Division 1 Soil in Space and Time for IYS.*

*By Erika Michéli, Division Chair*

Division 1. of IUSS coordinates and harmonizes research activities on observation, genesis, classification and mapping of the soil body and landscapes and communicates results to the soil science community, soil users and to the general public.
During 2015 the International Year of Soils the priority of the division was to: organize visible celebration events, perform educational activities for young people and awareness raising events for the general public, and get the "key soil messages" out from the soil science community.

**Divisional activities:**
**International Field Course and Soil Judging Contest,** 1-5 September in Hungary (120 participants, 28 countries, 16 teams; for the detailed report the reader is referred to the section IYS Conference and Meeting Reports)
Homepage still running:
http://soiljudging-iys2015.com/

**The African meeting of the International Year of Soils** – organized with the Soil Science Society of East Africa. Subtitle: Soils and land use for climate smart agriculture, 23-27 November 2015, Morogoro, Tanzania (100 participants, 9 countries)

**Expedition to the Olduvai Gorge – the cradle of mankind** (pay respect and celebrate the IYS, taking soil monolith) 27 November-2 December 2015 (**IUSS,** Kenyatta University, Kenya, Sokoine University, Tanzania, Szent István University, Hungary)

**Commission Activities**
*Soil morphology and micromorphology*
*Chair: Rosa M Poch, Vice-Chair: Richard Heck*
The commission is circulating regular Newsletters.

***Events:***
**Intensive Training Course On Soil Micromorphology**
Zagreb, 17 -28 August 2015

**Archaeological Soil Micromorphology Workshop**
Dalrymple WASM: Department of Chemical and Geological Sciences of Cagliari University. 5-8 June 2015

**Developing International Geoarchaeology, DIG2015**: Sassari University, Department of Architecture and Design in Alghero, 9-12 June 2015

**Book:** Micromorfología de suelos y técnicas complementarias
JC Loaiza, G Stoops, RM Poch, M Casamitjana (Eds.)
First comprehensive handbook on soil micromorphology and ancillary techniques in Spanish.

**1.2 Soil geography**
Chair: Thomas Scholten, Germany, Vice-Chair: Angel Faz Cano, Spain
The Commission participated in several IYS events, such as SUSTAIN, SOM, WRB, RAISIN, DBG. The Commission will have a Soil geography session during EGU 2016.

**1.3 Soil Genesis**
Chair: Teruo Higashi, Japan, Vice-Chair: Nikolay Khitrov, Russia
No report submitted

**1.4 Soil classification**
Chair: John Galbraith, USA, Vice-Chair: Augusto Zanella, Italy
The commission is circulating regular Newsletters Participated in the development of the International Field Course and Soil Judging Contest.
The biggest Commission event is being organized: Soil Classification 2016. South Africa 1-7 December 2016, Conference and Fieldtrip

**1.5 Pedometrics**
Chair: Budiman Minasny, Australia, Vice-Chair: Lin Yang / China
The commission is circulating regular Newsletters and runs a homepage: https://pedometrics.wordpress.com/
**Pedometrics Conference** was held as part of IYS 2015, 14-18 September, Córdoba (Spain)

**1.6 Paleopedology**
Chair: Daniela Sauer, Germany, Vice Chair: Sergey Sedov, Mexico

**Dan Yaalon Symposium** in Vienna, Austria, 8–11 April 2015
(Organizers: Karl Stahr, Franz Ottner, Daniela Sauer, Daniel deB Richter, Danny Itkin)

**EGU in Vienna, Austria, 12–17 April 2015,** Session: Soil as a Record of the Past: Landscape evolution by natural and cultural processes (Conveners: Sjoerd Kluiving, Daniela Sauer, Marc Oliva, Ian Simpson)

**INQUA Congress in Nagoya, Japan**, 26 July – 2 August, 2015, 3 Sessions organized by the commission
**Workshop „Soils and Paleosols of Brazil"**, Campinas, São Paulo State, Brazil, 23 – 29 Aug 2015

**5th International School on Paleopedology** in Ust-Kamenka village, 70 km from Novosibirsk, Siberia, 23–28 Aug 2015 (Organizers: Maria Dergacheva, Alexander Makeev)

**International conference "SOILS OF COLD AREAS: GENESIS, GEOGRAPHY, ECOLOGY",** dedicated to the 100th anniversary of Oleg V. Makeev, Ulan-Ude, Russia, August 31 – September 9, 2015 (Organizers: Nimazhap B. Badmaev and team)

**6th International Geochronology Summer School** 'Dating Anthropogenic and Natural Changes in a Fragile Alpine Environment' 30 August - 04 September 2015 in Bergün, Switzerland (Organizers: M. Egli, H. Gärtner, P. Cherubini, S. Ivy-Ochs, D. Dahms)

**Working Groups**
- Acid Sulphate Soils
- **Cryosols**
- **Digital Soil Mapping**
- **Digital Soil Morphometrics**
- Forest Soils
- Global Soil Change
- Heritage Soils
- Hydropedology
- International Actions for the Sustainable Use of Soils
- Land Degradation
- Modelling of Soil and Landscape Evolution
- Paddy Soils
- Proximal Soil Sensing
- Salt-affected Soils
- Soil Monitoring
- Soil Information Standards
- Soils of Urban, Industrial, Traffic, Mining and Military Areas (SUITMA)
- **Universal Soil Classification**
- **World Reference Base**

**Cryosols**
**Chair: Megan Balks**, New Zealand
Newsletters, Calenadar for 2015
**Digital Soil Morphometrics**
Chair: Alfred Hartemink, University of Wisconsin / Madison, USA
Global IUSS Workshop, Digital Soil Morphometrics, 2-4 June 2015, Madison, WI
Book: Digital Soil Morphometrics
**Universal Soil Classification System**
Chair: Jon Hempel, USDA-NRCS / USA
Regular newsletters, running a homepage
Several meetings, progress reports, publications
**World Reference Base**
Chair: Peter Schad, Technische Universität München
WRB 2014 – testing fieldtrip (Ireland)
WRB 2015 update- Online available

**Activities as Division Chair:**
**Invited to meetings /papers as division chair**

**Inaugural Global Workshop on *Digital Soil Morphometrics***
**1-4 June 2015, UW Madison, Wisconsin, USA**
Micheli, E.: Digital soil morphometrics brings revolution to soil classification

**ASA, CSSA and SSSA International Annual Meetings, 15-18, November 2015**
Session: Innovations in International Pedology:
Micheli, E.: From Dokuchaev to Numerical: Advances in Observation and Classification of Soils

**The African meeting of the International Year of Soil** – organized with the Soil Science Society of East Africa. Subtitle: Soils and land use for climate smart agriculture, **23-27 November 2015, Morogoro, Tanzania**
Micheli, E.: Application of soil classification knowledge in the intensification of food production

## *Activities of Division 2 Soil properties and processes for IYS*

*by Kazuyuki Inubushi, Division Chair*

Each commission of Division 2 organized several activities for the International Year of Soils (IYS). The division chair supported these activities by providing partial financing and by attending as many events as possible personally. He furthermore contributed a paper to the IUSS publication *Task Force: Soil matters – Solutions Under Foot* and contributed to present papers for the collection of activities of IUSS Divisions and Commissions during the IYS at the IUSS website.

Other satellite symposia were held, such as the **11th ISEB (International Symposium of Environmental Biogeochemistry) in Piran, Slovenia, Sept 28-Oct 2, 2015**, following the SUSTAIN Symposium in Kiel, during which the Dynamics of Biogeochemical Systems: Processes and Modelling were discussed, with a focus on

- Heavy metal contaminated soil and biological treatments
- Greenhouse gas emissions from soil
- Unique coastal and underground ecosystems

The **9th International Symposium on Plant-Soil Interactions at Low pH, Dubrovnik, Croatia, October 18-23, 2015,** started with the following plenary lectures

- Zed Rengel - Acid soils, climate change and greenhouse gas emissions
- Peter Ryan - Why some plants cope with acid soils better than others: What we know and what we don't
- Chunzao Mao - Molecular regulatory mechanisms of phosphate starvation response in rice
- Jurandir Magalhaes - Improving crops for agriculture on acid soils: A molecular breeding perspective

**Report of Commission 2.3 Soil Biology**

*by Ellen Kandeler, Commission Chair and Susumu Asakawa, vice-chair of Commission 2.3*

Commission 2.3 actively contributed to the conference "Ecology of Soil Microorganisms", which was held in Prague, Czech Republic, from the 29th of November to the 3rd of December 2015, with about 380 participants from 28 countries. It started with a session on "Microbial life in contaminated and anthropogenic soil", followed by "Biodiversity and functioning of forest soils", "Soil biogeochemistry and nutrient cycling", "Biodiversity of functioning of Agricultural soils", "Interactions among micro- and macroorganisms" sessions and also "Trainbiodiverse-Exploring soil biodiversity across Europe" by younger participants of the EU project. "Microbes in changing environment" and "Archaeo- and Paleo-microbiology and microbial forensics" were lectured by outstanding soil microbiologists. About 270 posters were presented.

**12th International Conference of the East and Southeast Asia Federation of Soil Science Societies (ESAFS), Nanjing, China, September 20, 2015**

Commission 2.3, co-organized with Paddy Soil Working Group

A joint symposium organized by Susumu Asakawa (vice-chair of the Commission 2.3 [Soil biology], Division 2 [Soil properties and processes]) and Mizuhiko Nishida (chair of the Paddy soils working groups, Division 3 [Soil use and management]) entitled "Research frontiers on microbiological and biochemical processes in paddy soil" was held with support from Zhongjun Jia (Inst. Soil Sci, CAS, China) at the 12th International Conference of East and Southeast Asia Federation of Soil Science Societies (12th ESAFS) in Nanjing, China on 20 September, 2015. The following eight topics were presented during the symposium.

1. Kazuyuki Inubushi (Chiba University, Japan): Nitrogen Fertility in Lowland Rice Fields in India and Japan Comparing to Upland Rice Fields in Uganda
2. Tongmin Sa (Chungbuk National University, South Korea): Methylobacterium from Rice, A Promising Biofertilizer
3. Jun Murase (Nagoya University, Japan): Diversity and Ecology of Microeukatyotic Community in a Paddy Soil
4. Fumiaki Takakai (Akita Prefectural University, Japan): Fate of Nitrogen Derived from Lime Nitrogen Applied for Enhancing Rice Straw Decomposition during Fallow Season
5. Shohei Riya (Tokyo University of Agriculture and Technology): Linking Drainage-Induced Nitrous Oxide Production and Functional Gene Expression of Nitrifier and Denitrifier in Flooded Soil
6. Zhongjun Jia (Institute of Soil Science, CAS, China): Gain-of-function for Atmospheric Methane Oxidation in Paddy Soil
7. Dongyan Liu (Nagoya University, China): The Changes of Active Community of Methanogenic Archaea in Paddy Field Soil in Response to a Management of Paddy-upland Rotation

8. Yan Zheng (Zhengzhou University of Light Industry): Competitive Interactions between Methane- and Ammonia-Oxidizing Bacteria Modulate Carbon and Nitrogen Cycling in Paddy Soil

Recent progress from the latest studies on microbiology and biochemistry of paddy soil including environmental issues, nutrient cycling and soil fertility was reported and discussed among the more than 50 participants. Support for a young individual's registration fee was provided by Division 2 and Dr. Liu was awarded it.

## Report of Commission 2.4 Soil Mineralogy

*by Balwant Singh, Commission Chair and Stephen Hillier*

Commission 2.4 co-sponsored a symposium workshop on "Clays in the Critical Zone: soils, weathering and elemental cycling" at the Euroclay2015 that was held at Edinburgh University from 5th -10th July 2015. The Critical Zone (CZ) symposium was convened by Paul Schroeder, Jason Austin (both from University of Georgia), Bruno Lanson (University of Grenoble) and Steve Banwart (University of Sheffield). The symposium was arguably the most popular symposium at the conference with the oral and poster presentations spread over 4 sessions on two days. Daniel Richter as a keynote speaker provided background and history of the critical zone concept; he further emphasised that how the exchange and contribution of CO2 and O2 from plants and atmosphere to soil system have been largely ignored in the past. The existing and proposed CZ laboratories offer enormous potential for interdisciplinary research and future research will consider geomorphology in conjunction with geophysics and geochemistry to understand the role of clays in CZ functions. Other oral presentations in the symposium included diverse topics such as the applications of C isotope method to determine soil changes or soil environments, weathering, dissolution and mineral formation in different soil environments, influence of cropping on mineral weathering, mineralogy in relation to the availability of micronutrients, Al-hydroxy interlayered mineral – role in phosphate sorption, formation in soils, influence of particle size on transformation of K-vermiculite to Al-hydroxy mineral, a talk proposing the synthesis of all data on hydoxy-interlayered Al, and sorption-desorption properties of minerals. All oral and poster sessions were well attended and the symposia chairs deserve an

*Lunch break at Euroclay 2015*

appreciation for a very well organized symposium. The session has spawned a thematic issue of Clays and Clay Minerals with papers dedicated to Critical Zone Science and is expected to appear in 2016.

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

*by Siobhan Staunton, Commission Chair*

The 7th ISMOM and 4th InterCongress Meeting of Commission 2.5 was held in Montreal, 5-10 July, where the first prize in recognition of the life-time work of PM Huang was awarded in the presence of Ming's wife and family. We are now looking forward to the next ISMOM, planned for 2019 and have bids from Japan and the UK, and others are still welcome. A mailing list for the Commission has been created and anyone who is interested in joining this list is invited to contact me (*staunton@montpellier.inra.fr*). We are also keen to receive any information relevant to the Commission to send out to all members.

### *Activities of Division 3 Soil Use and Management for IYS*

*By Takashi Kosaki, Division Chair*

The International Union for Quaternary Research, XIX Congress (INQUA Congress 2015) took place July 26 through August 2, 2015, Nagoya Congress Center, Nagoya, Japan

Once every four years, Quaternary researchers from all over the world meet at the INQUA Congress to exchange the latest research results and develop agendas for the years to come. In 2015, the Congress took place in Nagoya, Japan. The Congress had 1,790 participants from 68 countries and regions (*http://inqua2015.jp/index.htm*). IUSS held for the first time in the congresses the following session below for promoting soils research activities in the community of Quaternary researchers.

Takashi Kosaki, Chair of Division 3 together with Professors Hirofumi Tshukada, Fukushima University, Japan and Edward R. Landa, University of Maryland, USA, and others convened the session entitled "Biosphere contaminated with artificial and natural radionuclides". Landa gave a plenary lecture entitled "Mineral hosts and microbial processes: A biogeochemical perspective on naturally occurring radioactive materials in the surficial environment" and 5 oral and 11 poster papers were presented from USA, Japan, France, China and Korea. Topics covered in this session include spatiotemporal monitoring, dynamics in terrestrial and aquatic ecosystems and mechanism of the movement of radionuclides such as Pu, Cs, I, Sr and Tc.

Those who presented oral and poster papers were not only soil scientists but also geoscientists, marine scientists, chemists, etc. and thus this session was considered to have succeeded in providing the forum for people in a variety of backgrounds gathering and sharing their idea and collaborating each other towards the solution of Fukushima issues in a multidisciplinary approach.

### Division 3, Soil Use and Management and Commission 3.3, Soil Fertility and Plant Nutrition

*By Takashi Kosaki, Division Chair and Toru Fujiwara, Vice-Chair, Commission 3.3*

The 13th International Conference on the Biogeochemistry of Trace Elements (ICOBTE 2015) took place July 12 through 16, 2015, Fukuoka International Congress Center, Fukuoka, Japan. More information can be found at: *http://www.icobte2015.org/index.html*

The ICOBTE 2015 was organized by the International Society of Trace Element Biogeochemistry (ISTEB) and the Japanese Society of Soil Science and Plant Nutrition (JSSSPN) in Japan where the heavy metal induced health problems, i.e. Itai-Itai and Minamata diseases, were discovered and thus the first environmental research on bioavailability of cadmium and mercury started. The conference was attended by more than 500 participants and provided them with a forum to exchange ideas on and discuss about the mechanisms of trace element biogeochemistry and their environmental significance. Division 3 and Commission 3.3 of IUSS supported and convened the following two symposia together with local and international members of ISTEB and JSSSPN

1) Division 3 and Commission 3.3 co-convened the symposium on "Remediation of Heavy Metal-contaminated Soils: Novel practical approach based on state-of-art science". The invited papers, i.e. "Alternate wetting and drying irrigation reduces total and inorganic As, but increases Cd in rice grain" by Rufus Chaney, USDA, USA, "Organoarsenical biotransformations" by Barry Rosen, Florida International University, USA, and "Impact of biochar on metal mobility and microbial community in contaminated soil" by Yong Sik Ok, Kangwon National University, Korea, were followed by 23 oral and 23 poster presentations from Sweden, New Zealand, Bangladesh, Pakistan, Australia, UK, Japan and others.

2) Division 3 supported the symposium on "Application of synchrotron radiation (SR)-based methods to biogeochemistry and environmental geochemistry of trace elements". The invited papers, i.e. "Synchrotron-based study on arsenic remediation and biotransformation" by Chuanyong Jing, Chinese Academy of Sciences, " and followed by 6 oral and 12 poster papers presentations from Japan, Australia, France, Italy and others.

The topics presented in the above symposiums deal mainly with methodological development using novel analytical tool and instruments, aiming at establishing remediation strategy on the environment contaminated with a variety of heavy metals. Further research and discussion should contribute to solving the issues to be handled in Division 3 of IUSS. The next ICOBTE conference will take place in Zurich, Switzerland, in 2017.

## Division 3 Soil Use and Management, and Soils of Urban, Industrial, Traffic, Mining and Military Areas (SUITMA) Working Group

*By Takashi Kosaki, Division Chair and Jean-Louis Morel, Chair, SUITMA Working Group*

1) The International Union for Quaternary Research, XIX Congress (INQUA Congress 2015) took place July 26 through August 2, 2015, Nagoya Congress Center, Nagoya, Japan

2) The 8th International Conference of the Working Group on Soils in Urban, Industrial, Traffic and Mining Areas (SUITMA 8), IUSS, was held September 20 through 25, 2015, The National Autonomous University of Mexico (UNAM), Mexico City, Mexico

**Soil Message**

1) Once every four years, Quaternary researchers from all over the world meet at the INQUA Congress to exchange the latest research results and develop agendas for the years to come. In 2015, the Congress took place in Nagoya, Japan. The Congress had 1,790 participants from 68 countries and regions (*http://inqua2015.jp/index.htm*). IUSS held for the first time in the congresses the following session below for promoting soils research activities in the community of Quaternary researchers.

Takashi Kosaki, Chair of Division 3 and Jean-Louis Morel, Chair of SUITMA together with Professors Makiko Watanabe and Masayuki Kawahigashi of Tokyo Metropolitan University, Japan, and also the members of the Japanese Society of Soil Science and Plant Nutrition, convened the session entitled "Urban soil development". Morel gave a plenary lecture and 6 oral and 2 poster were presented from France, Japan and Mongolia.

Soils studies in Quaternary research have mainly belonged to peleopedology with the goal to help reconstructing paleo-environment but are now shifting their direction to understanding more about processes as summarized by Watanabe. They all recognized that the studies of the impact of the human activity and the response of soil in urban area are rightly on the stream of Quaternary research and thus further researches in soils under human impacts in historical as well as modern time scale to promote active interactions between Soil Science and Quaternary researches is highly required. The next XX INQUA Congress will be in Ireland in 2019.

They also published "Soils of Anthropized Environment" as Supplementary Issue of Soil Science and Plant Nutrition (SSPN), one of the IUSS cooperating journals, in July and distributed during the congress. Since all papers in this issue are freely accessible by courtesy of the publisher (Taylor and Francis) till the end of October, all of you are very much welcome to visit its web site (*http://www.tandfonline.com/toc/tssp20/current#*) and feel free to download whatever you are interested in.

2) Worldwide urbanization has risen from 25% in 1950 to more than 50% nowadays. By 2030 more than 60% of world's population will live in cities. In consequence, the soil surface is increasingly sealed by constructions, roads railroads and airports. Also industrial and mining activities have affected severely particular terrains, which need rehabilitation. People living in cities, opposite to indigenous rural communities, are seldom aware of the vital processes occurring in soil, which maintain plant cover, and regulate water and air quality. The purpose of the congress is to provide a forum for gathering the scientists and people working on the soils taken care of by SUITMA Working Group and share, discuss and distribute the up-to-date information to each other and to the open public. The congress is programed for oral and poster presentation together with pre- and post-congress tours.

(*http://www.geologia.unam.mx/~cisu/suitma8/*)

## *Activities of Division 4: The Role of Soils in Sustaining Society and the Environment for IYS*

**Division 4 IUSS-IYS final report**

During this "2015, International Years of Soils (IYS)" Division 4 developed different activities for large audiences such as:

- publication of the Division 4 newsletter: "Soil Connects",
- short articles (10) to be put each week on the IUSS website from October to December 2015,
- participations in local, national and international seminars, symposium and conferences targeted to large audiences / the general public,
- exhibitions on soils and workshops to improve soil awareness.

### The Division 4 newsletter *"Soil Connects"*

This newsletter (c.a. 20 pages) was created and is managed by Damien Field.

The first issue was published in December 2014, the second in July 2015 and the third one will be published in December 2015.

*Soil Connects* is largely illustrated and provides short articles from Division 4 members, announces scientific events and new books published.

### Short articles on IUSS website

From October to December 2015, each Division 4 commission proposed one or more articles to be download from the IUSS website. See Table 1.

The articles can be found in full length at the end of this chapter providing an overview of Division 4 Commission activities for IYS.

**Participations in local, national and international seminars, symposium conferences and exhibitions**

The information below was received from: Christian Feller (chair Division 4), Damien Field (chair Commission 4.4), Ian Hollingsworth (vice-chair Commission 4.1) and Cristine Muggler (vice-chair Division 4).

## *Australia and New Zealand: International Year of Soil. Achievements of IYS 2015.*

Soil Science Australia, New Zealand Soil Science and Oceania

*by Ian Hollingsworth*

The IYS core goal was to raise public awareness of the importance of soils through a range of activities beyond the usual technical symposia in Australia, New Zealand and the South Pacific. Most

| Week | Commission | Author | Titles |
|---|---|---|---|
| (1) Oct 5-11 | Div. 4 Chair | Feller C. | The IUSS Division 4 |
| | Div. 4 Vice Chair | Muggler C. | Towards the IYS: the challenge of bring people to care about the soil |
| | Div. 4 Chair | Feller C. | Soil connects Nature and Culture |
| (2) Oct 12-18 | Comm. 4.1 | Hollingsworth I. | Connecting people with soil |
| (3) Oct 19-25 | Comm. 4.2 | Hettiarachchi G. | Growing food crops on urban brownfields. Best management practices to reduce potential human health risk |
| (4) Oct 26 - Nov 1 | Comm. 4.3 | Ryusuke H. | Key processes and factors to mitigate land degradation |
| (5) Nov 2-08 | Comm. 4.3 | Jabro J. | Soil compaction |
| (6) Nov 9-15 | Comm. 4.4 | McBratney A. & Field D. | Making connections through Global Soil Security |
| (7) Nov 16-22 | Comm. 4.5 (History) | Demas S.Y. (and Sauer T.) | A soil treasure unearthed |
| (8) Nov 23-29 | Comm. 4.5 (History) | Churchman J. | Books from Commission 4.5 |
| (9) Nov 30-Dec 6 | Comm. 4.5 (History) | Feller C., Blanchart E. & Brown G. | Popularity of earthworms before and after Darwin |
| (10) Dec 7-15 | Comm. 4.5 (Sociology) | Doyle R. | Links between soil science, indigenous landscape knowledge and society – examples from NZ and Australia |

*Table 1. Articles from Division 4 published on the IUSS website.*

of the activities fit into IUSS Division 4 Soils & Environment.
Awareness and understanding of the importance of soil for food security and essential ecosystem functions varies across the region between highly urbanized market economies like Australia and New Zealand and Nations where subsistence agriculture is a major part of the economy in Melanesia, Polynesia and East Timor.

Activities organized under the following specific objectives of the IYS 2015:

1. Raise full awareness among civil society and decision makers about the profound importance of soil for human life;

- Department of Agriculture and Water sponsored publication of Soil Science in Australia – an IYS small book to celebrate and promote wise management of the Australian soil resource.
- Steward of the soil photographic competition (Richard MacEwen)
- Tasmanian soil photographic competition - Tasmanian Branch of Soil Science Australia invited photographers of all ages to enter its Tasmanian Soil Photo Competition. The judges are looking for striking images of soil in Tasmania that highlight the beauty, values, roles and importance soils have within the human and natural environments.
- Celebration of food and drink and the soil that produces it from the landscapes of Victoria (Richard MacEwen)
- Film, art, music, soil - 'Celebrate Soil', in Federation Square Melbourne on World Soil Day (Richard MacEwen).

2. Educate the public about the crucial role soil plays in food security, climate change adaptation and mitigation, essential ecosystem services, poverty alleviation and sustainable development.

- NZ Soil Science Society developed an informative and interactive Soil website: *www.ilovesoil.kiw* targeting the general public and suitable for primary school teachers and children, with fun activities related to soil and a legacy beyond IYS
- NZ Soil Science Society World Soils Day activities including public talks and seminars in regional centres throughout NZ were promoted in the media featuring soil scientists on national radio in newspapers and the farming press.
- FIJI Department of Agriculture International Year of Soils promotion to commemorate the Golden Anniversary of Soil Science in Fiji by a publication and in the Fijian media.
- Soil Science Australia Special Publication for the Year of Soils (Linda Bennison)
- There were active soil education programs in schools. The Queensland Branch of Soil Science Australia (SSA) adopted a three-pronged approach for soil science communication running stalls at Community events, school workshops and teacher professional development sessions.
- The QLD branch developed four teacher guides to teach soil science that fit within the National high school science curriculum. These guides incorporated advice and final review from science teachers.
- Professor Rob Fitzpatrick gave the inaugural Boodja lecture in soil science, Western Australia "Boodja" is a Noongar word for 'land' and this lecture series acknowledges the important role of Aboriginal understanding in the responsible management of the soil and land. For thousands of years Noongar people have resided on and had cultural connection to this land. Everything in our vast landscape has meaning and purpose – and the connection to Boodja (the land) is passed on through stories and expressive forms of art.
- In the Northern Territory we supported schools programs describing soils in school or community gardens, seeking to inculcate an understanding that food comes from soil and how to produce it by looking after soil and water.
- Promotional of IYS goals and media interviews at the Darwin annual Garden Spectacular, an exposition of horticulture for urban dwellers, which receives strong media attention.

3. Support effective policies and actions for the sustainable management and protection of soil resources;

- Indigenous knowledge project – linking soil science, indigenous landscape knowledge and society in New Zealand and Australia (Richard Doyle)
- Soil information was the subject of international regional collaboration between University of Sydney researchers Budiman Minasny & Damien Field and Baba Barus from Institute Pertanian Bogor. The workshop, titled Soil Information to secure Agriculture & Food Security in Indonesia was held on the 18th October 2015 at Institute Pertanian Bogor. Soil information is used at the ministerial level to allocate land for crop production, set fertilizer subsidies, and to reclaim and

manage agricultural land. The Australia Indonesia Centre funded this event, which discussed how the soil information system be used to manage sustainable expansion and intensification of agriculture in Indonesia.

4. Promote investment in sustainable soil management activities to develop and maintain healthy soils for different land users and population groups;

- Promoting awareness of the value of soil to grow food in urban community gardens using social media Growing from the ground up interviews (Ian Hollingsworth)
- The Remote indigenous garden network and ACIAR Project Making links between subsistence agriculture in Northern Australia, Melanesia and the urban community garden network to improve food production in urban areas and food security in remote communities by sharing soil knowledge and crop plants. (Anthea Fawcett, Tania Paul, Ian Hollingsworth)

5. Strengthen initiatives in connection with the Sustainable Development Goals process and Post-2015 agenda.

6. Advocate for rapid capacity enhancement for soil information collection and monitoring at all levels (global, regional and national);

- To this end the Faculty of Agriculture and Environment at The University of Sydney hosted the 2015 Research Symposium titled "Soil to save our planet" on 14 of July 2015. The Symposium brought together International and Australian experts to present their latest research and ideas on innovations to drive the future, focusing on how soil contributes to our planet's continued functioning and human wellbeing.
- Patron of Soil Science Australia, the Hon. Dr. Penelope Wensley AC presented the trophy for the National student soil judging competition, Mundijong, Western Australia to the winning team from LaTrobe University (Tim Overheu)

Soil received heightened attention in the media during 2015. There were 4,654 hits for international year of soils as a topic on the ABC (Australian Broadcasting Corporation) web site. The issues covered were soil and gardening, sustainability, land use, locally grown produce…

***Australia: specific activities from Div4 members***

Related to soil security, soil education and soil awareness, besides the formally advised activities of the Australian Society of Soil Science, other public events were organized or communications given in Australia and other countries (USA, Malaysia) by **Damien Field** (Commission 4.4 chair) on behalf of IUSS Div4.

*Organization*

2015, May 19-21. "Global Soil Security Symposium", Texas A&M University (USA).
Organizing Committee and moderator of the session 2 "Condition".

*Communications (D. Field)*

- 2015, May 19. (with A. McBratney). *Aspects of Soil Security.* "Global Soil Security Symposium", Texas A&M University (USA).
- 2015, April 5-7. *Soil Security: Addressing the Challenges of Food Security*. Malaysian Soil Science Society Conference, KL, Malaysia, (Plenary)
- 2015, August 19. *Soil security, food production and nutrition-sensitive policy.* "Resetting the Australian Table: adding value and adding health". Charles Perkins Centre & Marie Bashir Institute, The University of Sydney.

## *Austria*

2015, Dec. 7. A Div4 **working group** on the "Future challenges for soils" will be held in Vienna during the "Celebration of the International Year of Soils 2015 Achievements and Future Challenges» meeting.

## *Brazil*

*by Cristine C. Muggler*

In 2008 the Soil Education commission of Division 4 of the Brazilian Soil Science Society (SBCS) started an inventory of existing soil education groups in Brazil. By now, there are more than 30 groups, most linked to university departments of Soil Science and Geography, but not only. Those groups developed or inspired a wide set of activities during the year as well as for the World Soil Day, as listed below:

*Education and outreach*

- *Trilha do Solo*. Soil trail at the State Park Serra Verde, Belo Horizonte, Minas Gerais. April, 11th.
- *Year 2015 tematic project "O solo é vivo!* Inves-

tigando a vida no solo" (Soil is alive: investigating life in the soil). February – December 2015. Project developed with basic education schools of Viçosa and region. The concept was offered to schools to work with and educational material was developed to support the school communities. In total, 25 schools joined the project, directly involving 53 teachers and 1150 pupils. A celebration of the project, including presentations and prizes, will happen on the 5th of December in the central square of the city, Viçosa, in a main event called "Viva o Solo!"

- *Exhibition "O Solo é Vivo".* Developed by the Earth Sciences Museum of the Federal University of Viçosa (UFV). It was opened at the Annual meeting of the Brazilian Society for the Advancement of Science (SBPC)", in São Carlos, state of Sao Paulo, July 12-18th. It was visited by 11 thousand people. After that it has been traveling and passed by Natal, Rio Grande do Norte (at the XXXV Brazilian Soil Science Congress), Rio de Janeiro (two months at the Science Centre UFF Ciência Viva), Simonésia, Minas Gerais (3000 visitors) and many schools in the region.
- *Exhibition "Solos de Minas".* Developed by the State Foundation for the Environment (FEAM) and the Soils Department of the Federal University of Viçosa (DPS/UFV), the set assembles 20 soil monoliths that represent the soil diversity of Minas Gerais State. Presented at the Natural Sciences Museum of the Catholic University of Minas Gerais in Belo Horizonte from May, 19th to July, 30th and Contagem from August 31st to November 15th. It was exposed in Natal, Rio Grande do Norte, at the XXXV Brazilian Soil Science Congress in August.
- *Exhibition "Sem solo, sem vida".* Developed by the Luiz de Queiroz Museum and the Soil in School Programme (Programa Solo na Escola ESALQ) of the State University of São Paulo, Piracicaba. It presents demonstrations and experiments of the hands-on area of the Programme as well as soil monoliths of the region. September 14th to October 30th.
- *Expedição Solo na Escola.* Two agronomists are travelling 32.000 km on bike crossing 18 countries in Americas, from Ushuaia to Alaska, in an Environmental Education Project focused on soils with the support of the "Programa Solo na Escola" from the Federal University of Paraná. They left Curitiba, Paraná on September 18th, to start from Ushuaia on September, 22nd. (*https://www.facebook.com/expedicaosolonaescola/timeline*)
- *Feira do Conhecimento O solo é vivo*. Knowledge Fair organized at the state school of Araponga, Minas Gerais, November, 19th.
- *"Você conhece o chão onde pisa?"* (Do you know the ground you step on?). Exhibition and workshops about soils for children of all ages organized by the Massapê Soil education group. Parque de Dois Irmãos, Recife, Pernambuco, December, 2-5.
- *Feira do Solo (Soil Fair):* exhibitions, lectures, radio interviews and agroecological open market organized by the Federal University of Campina Grande (UFCG) *Solo na Escola* project in Sumé, Paraíba, November, 26th to December, 4th.
- *Comemoração do Dia do Solo* no Projeto Solo na Escola Geografia USP. Soil Day comemoration at the Soil in School Project of State University of São Paulo. Field classes for the public and activities for children. December, 3-4th.
- *Exhibition "Solos da Paraiba"* and short course on soils. Organized by the Soil Science Department of the Federal University of Paraíba, November, 25-27th.
- *Public open space presentations on soils* by the Soil Study Group (GESOLO) of the Federal University of Rio Grande do Norte, campus Macaíba, October 21st to December, 5th. *https://www.facebook.com/grupogesolo/timeline*
- *Commemorative exhibition on the World Soil Day* at the Barigui Park, Curitiba, Paraná. At the event the film produced by the Paulo Freire TV "Vamos Conservar o Solo?" will be launched.

*Scientific meetings, seminars and field days*

- Public perception and social representation of soils: barriers or tools for soil conservation? Symposium held by Division 4 at the Brazilian Conference Governance of Soils, Brasília promoted by the Brazilian Federal Court of Accounts, with the support of the Brazilian Soil Science Society and Embrapa Soils, March 25-27th.
- Mês do Solo na UFRGS (Soil Month at Federal University of Rio Grande do Sul). Commemoration of the International Year of Soils by the post graduation programme in Soil Science that includes Field day, Seminars and lectures as well launching of publications. November, 20 to 27th and December, 4 to 17th.
- Encontro Regional do Ano Internacional dos Solos: Alimentos e Vida. Organized by the State University of the West of Paraná (UNIOESTE), Campus Francisco Beltrão. October 27th.

- Functionalities and responsible use of soil resources. Symposium organized by the Study Group on Soil Science (NECS) of the Federal University of Lavras (UFLA), November 30th to December 4th.
- Field celebration day on soils. Organized by the Soil Department of the Federal University of Santa Maria (UFSM) and the State Foundation on Agricultural and Livestock Research (FEPAGRO). Júlio de Castilhos, Rio Grande do Sul, December 2nd.
- I Simpósio de Ciência do Solo / I Expo Solos. Organized by the Soil in School Project and Soil Science Post Graduation Programme of the Federal University of the Recôncavo da Bahia to celebrate the International Year of Soils. It will be held in Cruz das Almas, Bahia, December, 3-5th
- Workshop World Soil Day. Organized by the Extension Programme Soil in School of the State University of Santa Catarina, Florianopolis, Santa Catarina, December, 4th.

*Awareness raising among civil society and decision makers*

- Public audience on Healthy Soils at the State Council of Paraná to celebrate the IYS, in Curitiba, Paraná, November 24th.
- Round tables, debates, press meetings and TV programmes at:
  - Curitiba City Council, November 9th (Soil Conservation) and December, 3rd (IYS).
  - Lages, Santa Catarina, December 2nd;
  - Viçosa, Minas Gerais, December 2nd.

Other activities and communications were given by Cristine Muggler (Division 4 vice-chair) on behalf of IUSS Div4 in Italy and Mexico:

- 2015, September 20-25 (Mexico City): Education strategies to promote awareness on urban soil ecological functioning: painting with soil materials. 8th International Conference of the Working Group on Soils in Urban, Industrial, Traffic and Mining Areas (SUITMA), of the International Union of Soil Sciences (IUSS).
- 2015, October 21-23 (Milan and Ispra). *The catwalk to soil awareness: achievements and challenges*. "ENSA Meeting 2015 - *Giving soils a voice"*

### *France and Belgium*

Besides the formal activities of the French or Belgium Society of Soil Science, different events for the general public were organized and communications given by **Christian Feller** (Division 4 chair) on behalf of IUSS Div4.

*Organization of events*

- 2015 Nov. 21 A «IUSS soil day» in Montpellier (Herault, France) entitled:
  *«Le sol, un patrimoine de l'humanité»* ("Soils, a mankind patrimony").
  There were 7 communications by soil scientists from Univ. Montpellier 2, IRD, Cirad and Inra.
  Audience: 70 people

- Two IUSS conferences for local learned societies given by Dominique Arrouays, the presently president of the French soil science society:
  - 2015, nov. 19 at «Académie de Lascours» (France, Bagnols sur Cèze):
    *«Les sols de la planète sont-ils en danger ? »*
    ("Are the planet Earth soils in danger?").
    Audience: 50 people.
  - 2015, Nov. 20 at «Les Conférences du Temple» (France, Uzès):
    *«Les sols au centre des grands enjeux planétaires »* ("Soils at the hearth of large planetary challenges?").
    Audience: 110 people.

*Communications (C. Feller):*

- 2015, 12 nov., at Academy of Nîmes (France):
  *«Les sols, un nouvel enjeu pour l'humanité» ("Soils, a new challenge for the humanity").*
  Audience: 60 people.
- 2015, 21 nov., at Montpellier (France, see above), 2 communications:
  *«Vous avez dit Sol ?»* ("You said soil ?")
  *«Le Sol et l'Art»* ("Soil and Art")
  Audience: 70 people
- 2015, 24 and 25 Nov., at Gembloux (Belgium), 2 invited communications (Key notes) to an "International Agricultural Seminar" organized by the CSA NGO and entitled «Fertilité des sols: échanges autour de pratiques innovantes…» ("Soil fertility: discussions about innovating practices"):
  - *«Gestion organique des sols: quelques réflexions»* ("Organic management of soils: some reflections"),
  - *«Humus et fertilité: une approche historique»* ("Humus and fertility: a historical approach").
    Audience: 70 people.

As mentioned above, during the 2015 International Year of Soils, the IUSS Division 4 illustrated its

main topics through articles written by Division 4 officers or their colleagues. These were published on the IUSS website every week from October to December 2015 and are reproduced here for ease of reference.

Towards the International Year of Soils:
**The challenge of making people care about the soil**
*Cristine Carole Muggler*
IUSS, vice-chair Division 4, and,
Departamento de Solos, Universidade Federal de Viçosa, Brazil,

As climatic conditions change and environmental problems grow, soil scientists and groups of soil users continue to speak out on the need to care for our soils. We know that soils are an integral part of the Earth system, a result from the interactions between atmosphere, hydro-sphere, biosphere and lithosphere that play a key role in regulating those interactions. For this, many of us have given soil a special place and refer to it as a system by itself: the pedosphere. This fragile layer on Earth's surface is essential to life: it creates and is created by life. It is alive!
Still, individuals and society in general do not realize that our quality of life and our welfare are at risk when soils are not cared for. More often than not people are more likely to be concerned with issues around water, forests, and endangered species, and while admirable causes, these do not realise the role of soil in supporting these issues and that securing soil is one of the grand challenges facing humankind. Underfoot, soils look needless of much care and are taken for granted. Despite soil campaigns and outreach movements of the last years soils are still not popular. This puts a challenge for us who know and work with soils, how are we to respond? The International Year is a great opportunity to reach out and spread the word about soils. Not only the functions and essentiality of soils, but also its wonders: amazing biodiversity, incredible colours and unexpected beauty! To realize about soils is a first step to know more about them. With knowing comes enchantment, which is the basis of love and care. This is a chance to bring more people to know about soils and to care.
To engage present and future generations with soils is our ongoing task. For some years now, the Latin American Soil Science Congresses has set aside a day for school children and teenagers to make public presentations and it is amazing to see how they are concerned about the threats to soil and choose to study them. At the last Congress in Cusco, Peru, Ronald Vargas, from FAO, was in charge of the initial presentation. He started to ask the children what is soil for them, and immediately a girl came loud and self-assured with the answer: Soil is *Pachamama*!! The mother Earth from the Inca civilization.
Of course this level of enthusiasm is still sporadic and there is much more to do to raise the soil's profile. Groups, actions, and initiatives are everywhere promoting the need to know and care for soils. This International Year now offers us the possibility of bring them together, making them visible and to generate activities. It is a challenge as well as an opportunity.

**Soil connects Nature and Culture**
*Christian Feller,*
IUSS, chair Division 4, and,
Institut de Recherche pour le Développement (IRD), UMR 210, F-34060 Montpellier cedex 2, France.

It is a typical feature of western and scientific thinking that nature and culture are distinguished separately. This conceptual split had become clearly visible during the 17th Century. As a consequence, 'primary' and 'secondary' qualities of natural bodies were differentiated. Measurable physical, chemical and biological properties have become the 'primary' qualities of the 'object'. Other qualities, which were perceivable by human senses only, be that perception ephemeral or generic, have been treated as being 'secondary'. This is characterised by the, sometimes difficult, distinction between; 'matter' and 'spirit', 'objective' and 'subjective', 'natural' and 'cultural', 'science' and 'art', and similar.
French anthropologist Philippe Descola is one of the great contemporary theoreticians of the nature-culture split, showing it to be neither natural nor universal. He argues in his works, *Par-delà nature et culture* published in 2005 (translated by Janet Lloyd, *Beyond Nature and Culture*, 2013), that our tendency to highlight the separateness of culture from nature facilitates a treatment of nature which is not respectful, and causes well-known environmental consequences.
This separation between nature and culture affects the soil, too. For one of the founders of pedology (soil science), Vasilii Dokuchaev (1883) soil is de-

fined as a 'natural object', and not so much as a vital or even spiritual 'subject'. Thus, soil is studied for the causal chains of its formation (genesis), its physical, biological, and chemical properties as well as for its functional use and services for humanity. The International Union of Soil Science Societies (IUSS) has dedicated three of its four divisions to that approach.

Beyond being framed as a 'natural body' there are cultural dimensions of soil that are reflected in traditions, such as, pigments for drawing, ceramic material, and colours and clays for customary or ritual body painting. Deeper than this there is a cultural layer of soil that is traceable by the polysemy (multiple meaning) of words like 'soil' or 'earth'. In French, 'soil' often hints to an 'origin', as can be seen by expressions like "Le sol de nos ancêtres" ("soil of our ancestors", for human societies referring to past specific cultures and traditions). In German, the term 'Grund' can be used for 'soil' and for 'cause'/'reason', both. Nikola Patzel in a chapter on European religious cultivation of the soil[1] writes that in many cultures of the world people know a "Mother Earth" or a Goddess inspiring all living matter. In Judaism, the memory is alive that the name 'Adam' comes from 'Adamah', that is 'soil' in Hebrew. These few examples show that soil can be meaningful in a dimension which is definitely outside materialistic concepts of 'nature', but located in the heart of culture.

This cultural dimension, occurring in different forms in all civilisations, may be also important (and is often ignored in development projects) for alternative approaches in order to change our behavioural patterns towards soils, soil materials, and soil life[2].

When writing of *The soils scientist's hidden beloved: archetypal images and emotions in the scientists relationship with soil*[3] Nikola Patzel describes the inner reality of the cultural dimension of soil which can be called the "inner soil", including all kinds of symbolic meanings for soil, and even spiritual relationships with it. From a psychological standpoint, the investigation of the "inner soil" leads to the questions: What are our unconscious or subconscious drivers and guiding images in our perceptions and conceptualisations of soil, leading us to love it or be disgusted by it, and to like or dislike certain soil management practices? What are our concepts of soil fertility and of soil health? Which mental and cultural patterns lead us for example to prefer in our soil relationships a computer-technical approach, an economic product value approach, an eco-functional approach, a relation formed by manual labour with soil, or guided by intuitions and symbolic thinking? So, there are many alternatives and complementarities concerning how we deal with soil.

It is one of IUSS division four's original topics to integrate viewpoints and results from the social science and humanities. For Division 4 "The Role of Soils in Sustaining Society and the Environment", history, education, health, justice, and economy for example all imply cultural dimensions. These perspectives open up the spectrum from physical and cultural soil services for human societies to the soil being a "cultural entity".

To further develop this dimension at the heart of Division 4 is one of our concerns.

## Commission 4.1 - Soils and the Environment

***Description of Commission 4.1***

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

During the 2015 International Year of Soils, the IUSS Division 4 will illustrate its main topics through articles written by Division 4 officers or their colleagues. These will each be highlighted every week from October to December 2015.

For this second week, we are displaying an article from the – Ian Hollingsworth.

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[1] Patzel N., 2010. European religious cultivation of the soil. Chapter 16, In: Soil and Culture. Landa E.R., Feller C. (eds), 2010, Dordrecht, Heidelberg, London, New York: Springer Press.

[2] Feller C., Compagnone C., Goulet F., Sigwalt A., 2015. Historical and socio-cultural aspects of soil organic matter and soil organic carbon benefits, chap. 14, pp. 169-178. In S.A. Banwart, E. Noellemeyer and E. Milne (eds), Soil Carbon: Science, Management and Policy for Multiple Benefits. Wallingford, UK: SCOPE, vol. 71, CAB International.

[3] Patzel N., 2010. The soils scientist's hidden beloved: archetypal images and emotions in the scientists relationship with soil. Chapter 13, In: Landa E.R., Feller C. (eds), 2010. Soil and Culture. Dordrecht, Heidelberg, London, New York: Springer Press.

**Connecting people with soil**

*By Ian Hollingsworth, Commission 4.1 vice-chair*
HORIZON Environmental, Soil Survey & Evaluation, Australia

There may be another world called water, but living on earth we use soil to produce food to survive. Soil substrates support the ecosystems surrounding us that provide oxygen and filter water. Eons of time have generated soil pattern and biodiversity that imprint resilience to climate change on ecosystems and agriculture. However, reducing biodiversity and harvesting soil and water resources for agriculture to support growing populations and urbanisation have significant regional impacts that may increase food production but make it less sustainable at the same time.

The risk that an agricultural system will fail translates directly to mortality and community annihilation in subsistence economies. Capital investment and the energy intensity in fossil fuels buffer unsustainable agricultural systems against failure to some extent in an industrial economy. We can run down biodiversity, deplete and contaminate water and soil resources locally until we run out of capital to purchase produce, or land, from somewhere else.

Current needs in developed economies to secure food supply motivate investment and development around the world. However, securing soil and water resources for agriculture could be at a tragic cost to cultural and ecological resources - particularly developing economies in the tropics with large populations to support. Clearing biodiverse forests, diverting rivers, draining wetlands displacing traditional economies and cultures to develop industrial agriculture in Africa, Asia, Australia and South America does not appear to be based on evidence that these developments will be sustainable.

A large proportion of the world's food is produced from smallholdings, urban gardens, forests, rangelands and aquaculture. Peasants probably have significantly more than half of the world's cropland and may be responsible for 70% of world food production. If we further disturb the global food production system with industrial agriculture we need to be aware of the sustainability implications and mitigate by design against catastrophic failure. Otherwise clearing native vegetation, supplanting small holder agriculture with industrial systems and urbanisation will remove the trace of millions of years of evolution and tens of thousands of years of cultural interaction with the environment and potentially reduce sustainable food production in a changing climate.

Moving communities from subsistence and small holder production to industrial, urbanised economies has pervaded development since the European industrial revolution. However, the impacts of these changes on securing soil to produce food and support sustainable landscapes may be reduced if communities can maintain connections to land. Perhaps urban planning to maintain the capacity to produce food, energy and fibre is as critical as transport and water supply services?

Perhaps designing industrial agricultural developments to the scale and pattern of landscape ecology is worth exploring? Diversifying food production and soil management in the development process is likely to be a more reliable strategy over the long term than expanding agricultural monocultures that industrial agriculture currently relies on.

For instance there is interest in agricultural development across Northern Australia that politics and capital are keen to support. Concerns about the risks from extensive agricultural development to indigenous culture and ecological systems hasn't so far translated into investment in agricultural innovations that use endemic plants and recognise cultural connection to land.

External interests are focused on crops and plantations that are exotic, acquiring land and water resources and developing infrastructure.

There is far less interest in numerous "bush" foods, fibers and medicines that supported a subsistence economy and were integral to the most biodiverse woodland and wetland environments in Australia. Agricultural innovation based on the endemic species and cultural knowledge may add more value.

## Commission 4.2 - Soils, Food Security and Human Health

***Description of Commission 4.2***

Soils are the essential for food production in most countries. Considering that one third of the land area is presently used for agriculture, and the world population is increasing, creating additional pressure on agricultural land, providing enough safe and nutritious food will be an ongoing challenge. Among the concerns of this commission, there is the maintenance and conservation of agriculture lands, the role of soils in a changing world in relationship to human health.

**Growing food crops on urban brownfields. Best management practices to reduce potential human health risk**

*By Ganga Hettiarachchi, Commission 4.2 chair; Kansas State University, Manhattan, USA*

Growing of local crops, especially in urban areas is on the increase and many gardens are or will be located on land that may be impacted by previous use. These kinds of properties, i.e. vacant or abandoned properties with real or perceived contamination issues are called “brownfields”. Not all brownfields sites will, of course, be suitable for growing food crops as the environmental conditions may not allow for this use. Growing food crops safely on mildly contaminated sites is possible for both the grower and consumer, if precautions are taken and best management practices are adhered to. Common urban soil contaminants include lead (Pb), arsenic (As), cadmium (Cd), zinc (Zn), and polycyclic aromatic hydrocarbons (PAH). Of these, lead is by far the most dominant and wide-spread contaminant in urban environments. Soil remediation or managing risk posed by contaminants can be challenging as a result of poor soil quality and the presence of co-contaminants. Options such as raised-bed gardening or soil replacement can be physically and financially restrictive and there is a great need for sharing science-based knowledge on risk management associated with common urban soil contaminants.

Researchers at Kansas State University have been evaluating the uptake of heavy metals, metalloids and other contaminants by food crops grown on urban brownfields sites. The research is made possible by a grant from the U.S. Environmental Protection Agency (USEPA). Nationwide, seven test sites were established on brownfields sites slated for community gardens were evaluated by planting food crops over two consecutive growing seasons. Prior to adding a site to the project, historic site use of all sites was researched to narrow down potential contaminants. Soils were then tested for potential contaminants as well as for general soil properties. Soils at the various test sites exhibited lead concentrations from 100 mg/kg to 2,000 mg/kg, arsenic concentrations from 50 mg/kg to 130 mg/kg, and total PAH concentrations ranging up to 50 mg/kg. Three vegetable crop types with three very different growth and contaminant uptake patterns were planted over two growing seasons and soil and plant tissue samples were tested. Effectiveness of selected site-specific soil amendments to reduce bioavailability of lead, arsenic and/or PAH was evaluated.

Root crops were the only crops accumulated soil lead above the Joint WHO/FAO CODEX maximum levels (MLs) with carrots taking up more lead than beets, radishes and sweet potatoes. In sandy soils with lead concentrations around 200 mg/kg to 250 mg/kg, lead concentrations in root crops exceeded the MLs of 1-1.5mg/kg (dry weight basis). Arsenic uptake by all crop types was low indicating that food-chain transfer of arsenic may not be a problem for urban brownfields. PAH uptake by all crop types tested at our test site contaminated with PAHs was non-detect.

Overall findings indicate the potential exposure pathway of concern is direct exposure of humans to contaminated soils. The pathway from contaminated soil to plant to human is insignificant. When deciding to grow food crops on a mildly contaminated brownfields site, two options exist: growing in-situ (directly in the soil) or growing in raised beds filled with imported (tested) soils. If raised beds are selected as a best management practice, care should be taken that the garden paths, sideways and in between the beds are covered to prevent exposure to dust. If in-situ growing is selected, the soil very likely needs to be amended using compost and fertilizer because brownfields soils tend to be of poor quality. Generally, actions are taken to improve soil quality may also help to reduce the bioavailability of soil contaminants.

Examples are:

1. Compost addition will dilute overall contaminant concentrations, and mature/stable organic matter in the compost and the iron oxides present in some products such as composted Class A-biosolids will bind metals and organic contaminants in soils and thereby reduce their bioavailability.

2. Compost addition also helps maintain good soil nutrient status in soils. Maintaining good soil fertility and thereby increasing biomass production diluted contaminant concentrations in the vegetables.
3. The nutrient phosphorus will transform lead into lead phosphate and reduce bio-availability.
4. Adjusting pH to around neutral (i.e. 6.5 to 7) will reduce the mobility of cationic metals such as lead and cadmium. For arsenic containing soils, the pH should not be adjusted to values over 6.5 to avoid enhanced arsenic mobility.
5. Soils may be impacted by more than one contaminant and a mixture of amendments (compost, phosphorus, and biosolids) would be beneficial.
6. Root crops such as carrots, turnips, etc. (i.e., extended hypocotyls) may be grown in raised beds or container with clean soil when soils have elevated levels of soil contaminants.

## Commission 4.3 – Soils and Land Use Change

***Description of Commission 4.3***

Soils play a large role as source and sinks of greenhouse gases. In a context of global sustainability, this Commission will investigate how the source/sink function of the soils can be managed and controlled to mitigate the impact of climate change. Land use change is of a major interest to all, what is the effect of urbanization, lost of productive land to other uses, forest conversion, and other changes are of major interest and these changes will fall under this Commission.

**Key processes and factors to mitigate land degradation**

*By Ryusuke Hatano,*
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At the 20th world Congress of Soil Science (WCSS) held in Jeju, Korea an inter-divisional symposium was held on the above with the purpose of specifying the key processes and the controlling factors that lead to soil and land degradation in land use and land management in every region. The base of the symposium was the Division 4.3 Soils and land Use Change (IUSS) focusing on its mission to integrate the knowledge of soil science and to inform stakeholders about the utility of the soil. Eight papers were presented in areas of soil carbon sequestration, methane and nitrous oxide emissions, eutrophication and soil acidification. Below, a summary of the results.

Two papers focus on changes in carbon stocks which have been achieved by converting secondary forest to Chinese fir and Moso bamboo, while research in Russia and Kazakhstan demonstrates an increase in soil carbon of abandoned crop fields being converted over to natural vegetation. Both acknowledge there is a trade-off between agricultural production and soil carbon sequestration. A third paper showed that the proper management of manure application in balance with plant nutrient demand maintained crop production without decreases in soil carbon. Research presented on tea plantation management showed that a combined application of chicken manure and chemical fertilizer reduced N2O emissions. Research in Lake Hachiro Japan, demonstrated that lowering the ratio of dissolved inorganic nitrogen to soluble phosphorus is a key factor for the growth of algal or cyanobacterial blooms. Also in Japan, on Ogasawara Island, soil acidification resulted from subsoil exposure by erosion by feral goats, while parts of the bare soil with high acidity received phosphorus and nitrogen derived from seabird activities.

These papers are examples to developing good practices for reducing soil and land degradation.

**Soil Compaction**

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Heavier machinery and inappropriate soil management have led to an increase in soil compaction (Fig. 1) prompting increased global concern regarding the impact of soil compaction on crop production and soil quality in mechanized agriculture. Soil compaction affects crop yields through alteration of soil physical, chemical and biological properties. Worldwide, problems from compacted soil affect an estimated 68 million hectares from farm machinery traffic alone. Research showed that approximately 80% of soil compaction from wheel traffic occurs on the first pass of a tire.

*Fig. 1. Soil Compaction caused by heavy machinery under wet field conditions.*

Soil compaction may occur during tillage, planting, spraying, and harvesting (Fig. 1). We generally think of compaction being caused by wheel traffic, but it can also be caused by tillage tools which cause a "hard pan" just below the tilled depth.

Soil moisture content has a great impact on soil compaction. Dry soils would not compact nearly as much as a moist soil under the same applied load. Heavy axle loads of large equipment tend to drive compaction deeper than light axle loads.

Soil compaction is a factor in reducing crop yield. Roots cannot easily penetrate compacted soil and therefore the plant can't absorb water and nutrients from the soil. Compacted soils do not readily absorb water so they contribute to increased runoff on slopes and ponding in low areas. Runoff may carry fertilizers and pesticides into streams and rivers.

Soil compaction can reduce crop yield up to 50% in some areas depending upon the depth of compaction and its extent.

Deep rooted cover crops (e.g., rye grass, oilseed radish, safflower, turnip) that can penetrate hard soils may be used to create root channels that later decay and loosen the soil. Deep tillage is commonly used to alleviate soil compaction. Increasing soil organic matter and encouraging earthworm activities can also soften compacted soils.

Research at the Northern Plains Agricultural Research Lab in Sidney, MT, USA showed that frequent freezing and thawing cycles decreased a majority of soil compaction at the 0 - 30 cm depth after the first winter in compacted clay loam soils (Fig. 2).

Fig. 2. Wheel tracks from a farm truck during the compaction process in a clay loam soil.

In addition to the methods mentioned above, limiting wheel traffic to a single path will subject a lesser portion of the field to compaction as will avoid field operations on wet soil.

The development of proper farming practices (e.g., no-till, reduced tillage, crop rotations) that minimize soil compaction is essential for maintaining good soil structure and eliminating the need for multiple field operations.

In conclusion, wheel traffic is number one cause to soil compaction in the field and stay out of the field when it is too wet (Figs. 1 and 2).

## Commission 4.4 - Soil Education and Public Awareness

***Description of Commission 4.4***

This commission deals with how we present knowledge teaching and the development of soil scientists as well as anyone interested in soils from a learning standpoint and the information we give to create a general public awareness of soils. A well informed public is needed so that the importance of soils is understood by all.

**Making connections through Global Soil Security**

*By Alex McBratney (past Deputy Secretary-General of the IUSS) and Damien Field (Commission 4.4 chair)*

Department of Enviromental Sciences, The University of Sydney, Australia

The soil science community already knows the crucial role soil has in accumulating nutrients and water to secure our food, fiber, biofuel and freshwater now and into the future. The role of soil as a habitat for a large diversity of organisms and supporting environmental and human

health is also firmly rooted in the soil scientist psyche. Over the last five decades food, water and energy security, along with the adaption to climate change, protecting biodiversity and human health are six global challenges that soil scientists need to be addressing. The challenge though for soil scientist is to ensure that their knowledge is not just limited to a discussion amongst themselves but also engages the broader community who are also tackling these existential challenges.

The realization that soil has an integral part to play in the global challenges has led to the concept of "soil security", which refers to the maintenance and improvement of the world's soil to produce food, fiber, freshwater, contribute to energy and climate sustainability, and help to maintain biodiversity and protect ecosystem goods and services.

At the 20th World Congress in JeJu, Korea this concept was introduced to the soil science community and recognized that soil security is framed by five dimensions. The dimensions of capability and condition focus on the biophysical evaluation of soil and asks the questions 'what can this soil do?' and 'what is the current state of the soil?' When focusing on food production, land suitability is an effective means of evaluating how the current condition of the soil can support grain, livestock and horticulture production.

But by focusing only on food production have we missed a trick? To know the soil's full potential we need to recognize that it provides functions that support a range of ecosystem services, such as nature reserves, water catchment, urban development and cultural significance, and when these are evaluated it is possible to describe what the soil is truely capable of. In fact experts claim that ecosystem services contribute $33 trillion annually to the global economy, and combining soil capability with cost, infrastructure, and human desires the opportunities are now fully explored. Capability provides a basis to quantify the soil resource across space and time which can be mapped, planned, modelled and forecast.

While everyone's problem, but not the central concern of the soil scientist, are the socioeconomic challenges when soil is not secure. Soil security frames this by placing a value on the soil, a need to know how people are connected with soil, and these along with the biophysical attributes, will contribute to good policy to secure the soil against further degradation. This is covered by the dimensions of capital, connectivity, and codification.

Both ecosystem services and green economies accept placing a value on soil viewing it as a stock from which goods are produced. This approach recognizes that the multi-functional nature of soil enabling both its productivity and ecosystem services to be valued, in other words, letting us compare apples and oranges. Such an approach was demonstrated at the World Congress by Anna van Paddenburg from the Global Green Growth Institute in Jakarta. Talking to 'Investing in Green Growth Investing in Soil Security', Anna described how a change in focus to include valuing natural resources results in synergies that support both agricultural production and maintain the surrounding ecosystem to support wildlife and water quality.

To support famers' connectivity with soil means having access to good soil knowledge. In the future, Johan Bouma from Wageningen University in the Netherlands talked at the congress of the need for knowledge brokers who have both current soil science knowledge and the social intelligence to see how this knowledge can be used to support the soil's capability and condition.

Connectivity though demands that society more generally is reconnected to the soil as a means to increase its value and security. To nurture the wider public's connection Robert Hill stated that success is often achieved when a clear message is developed focusing on a single indicator for change. Although single indicators are not endorsed by soil science generally, the recent focus of society and its understanding of soil carbon would suggest that if a single indicator was needed, should be soil carbon?

Evidence suggests that national, let alone internationally agreed, policy around soil is sporadic with few countries, such as Korea, having well-developed integrated regulatory strategy. Having society connect with soil and providing accessible soil capability and condition data will improve the opportunity for policy development to secure soil. All of this can only be achieved when soil scientists, economists, social science and policy makers discuss and all contribute to the decision making about soil and this is what soil security is striving to achieve.


**Therefore, there is a seventh global and existential challenge, that of soil security!**

## Commission 4.5 - History, Philosophy, and Sociology of Soil Science

Description of Commission 4.5

This commission deals with our past; it links the study of what has happened in history and how soils can be used to help explain the past changes. This commission is not just a record of the history but the use and understanding of soils information and it relationship to human development and history.

**Soil Treasure Unearthed**[4]

Susan Y. Demas* and Eileen Miller**
Natural Resources Conservation Service (NRCS), USA * Major Land Resource Area, NRCS and ** New Jersey NRCS.

With a presentation by Thomas Sauer
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*This article was sent to me by Susan Demas and, as Chair of Commission 4.5, I felt that it was an excellent contribution for the IUSS participation in the IYS. It tells a story of discovery and of an appreciation for soils that is now almost 100 years old.*
*Thomas Sauer*

Here the reader is kindly referred to the separate chapter "Soil Treasure Unearthed", where the full article is published.

**Published books from Commission 4.5**

*By G. Jock Churchman,*
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Since 1997, four substantial books have been among the outputs of Commission 4.5 on the History, Philosophy and Sociology of Soil Science. This Commission was the brainchild of Dan Yaalon (1924-2014), one of the giants of Soil Science and of its interface with society. The commission has also been active by publishing a newsletter, also edited by Dan Yaalon for many issues, but in recent years produced by a similar group in the Soil Science Society of America; the combined newsletter was edited by Eric Brevik until quite recently.

The four books are:

- *Dan H. Yaalon and S. Berkowicz (eds.), 1997. History of Soil Science: international perspectives. Advances in geoecology 29, Catena Verlag: Reiskirchen, 438pp.*
- *Benno P. Warkentin (ed.), 2006. Footprints in the Soil – people and ideas in Soil History. Elsevier: Amsterdam, 534 pp + 5pp. colour plates.*
- *Edward R. Landa and Christian Feller (eds.), 2010. Soil and Culture. Springer: Dordrecht, 488 pp. + 36 pp colour plates.*
- *G. Jock Churchman and Edward R. Landa (eds.), 2014. The Soil underfoot: infinite possibilities for a finite resource. CRC Press: Boca Raton, 421 pp. + 16 pp. colour plates.*

There is a thread connecting all of the 4 books, even if none was planned to keep them in line. Indeed, the books are quite diverse in origin, with contributors over the whole set coming from 27 different countries in 5 continents and also assorted island nations.

[4] An earlier version of this article, prior to the donation to NAL appeared in Pedologue, the Newsletter of the Mid-Atlantic Association of Professional Soil Scientists, Summer or Spring/Summer (it is listed in both ways) 2015 issue. Link to the MAPSS website and Pedologue http://www.midatlanticsoilscientists.org/pedologue/

***History of Soil Science*** provides a good grounding in time, in place and in essential topics for our science. Its contributors to 23 chapters are mostly soil scientists. Together they cover such topics as the histories of humus, horizons, classification, mapping, soil pH, mineralogy and physics, and they also cover the history of soil science in several parts of the world and its organisation internationally. In addition, they feature the lives and achievements of several of our science's greats, including its only Nobel prizewinner, Selman A. Waksman.

> *Only three significant paradigm shifts can be identified: Liebig's mineral theory of plant nutritions of the 1840's; the recognition of the soil profile (later pedon) as an organized body subject to the influences of largely independent soil forming factors in the 1880's by Dokuchaev, Hilgard and later Jenny, and acceptance of the deterministic process-response model for soil reconstruction in the 1960's and 70's* – Dan Yaalon, Chapter 1, "History of Soil Science: Tortuous Paths, Paradigm Shifts".

***Footprints in the Soil*** largely continues the theme of the history of our science and its component parts, but also introduces pre-historical and anthropological perspectives, together with modern concerns about soils. Furthermore, many of its 18 chapters have a strongly philosophical aspect to them. While most contributors are soil scientists, this book makes us aware that a lot of our colleagues have a world view that is much wider than just soil profiles and soil analyses. Topics traversed include Roman, Aztec and indigenous knowledge of soils world-wide, the debt we owe to our scientific pioneers, as well as up-to-date concerns like erosion and conservation, soil health, and environmental issues.

> *The future will place even more stresses upon the diminishing soil resource as we try to feed the expanding soil population. This coincides with the end of the era of cheap energy. There is the threat of climate change disrupting agricultural systems. Globally, water quality and quantity are declining. We will need to invest more in methods to manage soils more sustainably through improved knowledge, make greater use of renewable resources, and "tread lightly upon the earth"* – Edward Gregorich, Graham Sparling and Joan Gregorich, Chapter 15 "Stewardship and Soil Health".

***Soil and Culture*** takes several steps sideways, often plumbing the knowledge, understanding and feelings about soils from outside of the scientific discipline, into the visual arts, literature, philosophy, religion, health, and even warfare, movies, postage stamps and cartoons. There is also history there, with an increased emphasis on indigenous and ancient view of soils. The 28 chapters in this book include a large number of contributions from others outside of our disciplinary walls. There is an aspect here of seeing "oursels as ithers see us", to quote Scots poet Robbie Burns (1786), or rather, to see our subject, soils, as other see it. In soils, these others, and the thoughtful soil scientists who also contribute, see a rich, interesting, and attractive world within soil. Its 36 colour plates demonstrate the charm and beauty that the visual arts have seen in soils, never again to be treated like dirt.

> *You see with Fallou and Jenny the polarity between the emotional and feeling approach on one hand, and the fascination with rational order on the other hand.....For example, in terms of scientific development and human society's relationship with soil: what can happen when Fallou's feeling that earth has aspects of a Goddess ("Isis and Ceres"), or Jenny's "respect", "wonder" and "reverence for soil" gets suppressed or lost? In fact, this had widely been the case, and one might argue that this contributes to the accelerated and ongoing soil deterioration and destruction in large parts of the world* – Nikola Patzel, Chapter 13 "The Soil Scientist's Hidden Beloved: Archetypal Images and Emotions in the Scientist's Relationship with Soil".

***The Soil Underfoot*** makes its particular mark through a view into the future of soils and the world on which it is grounded, while continuing the themes of soils as inherently valuable visually, religiously and for the services they provide. It is compiled within the context of the challenges that beset humanity, especially those of world hunger, climate change and pollution but also sets out to praise soils and their infinite fascination. It introduces some technologies and land uses involving soil properties. It also retains a historical perspective, including among its 30 chapters some on the effect of human history on soils and also on the use of soil studies to help decipher human history. Chapters include critical examinations of the contributions of some pioneers of our science. Ultimately, the book points to possibilities for an optimistic view of how soils can help us navigate into a sustainable future for a burgeoning human population.

*Knowing that cropland expansion and increasing the withdrawals of blue water for irrigation are not major options for meeting future demands on global croplands places useful constraints on what priorities should obtain as the necessary fundamental science is developed over the coming decades. Knowing further that a major goal is instead to optimize the availability and productive flow of green water not only helps to focus research priorities, but also highlights the importance of methodologies that, unshackled by adherence to conventional disciplines, fully respect the complexity of soil ecosystems, which "remain firmly, but uncharismatically, at the foundations of human life" (citing J.R. McNeill and V. Winiwarter, Science, 2004)* - Garrison Sposito, Chapter 30, 'Sustaining "The Genius of Soils".

Overall, these books have enabled us to see where we have come from as soil scientists, giving us a global understanding of the challenges of our work. They have introduced us to many of our pioneers as often very human. They have given us new perspectives from outside our scientific discipline on soil and soils as valued and interesting materials and as integral parts of the environment and human culture in ways that had hardly occurred to us before. We learn that our sustenance requires the sustenance of the soil if a good future is to beckon. But these books hardly contain the last word on soil. Perhaps, above all, they tell us about just how fascinating and multi –faceted is our topic of interest, the soil. They have introduced us to new and surprising possibilities to explore as we venture into the past, present and future of soil.

**Popularity of earthworms before and after Darwin**[5]

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The importance of earthworms for soils and society has undergone various phases, from profound recognition to utter ignorance and disdain. In fact, the perception of earthworms by modern humans was completely modified by Darwin's book published in 1881 (Feller et al., 2003). Historically, three periods can be distinguished regarding the popularity of earthworms: Antiquity, before Darwin, and after Darwin.

In classical Greek times, the mode of life and use of earthworms were well recognized and Aristotle called them the "earth's entrails" (or intestines), probably because they lived in and moved inside the soil, churning it up. In Babylonian times they were used in medicines against lumbago (lower back pains), and in the Egyptian Empire they served as meteorological indicators (to predict weather phenomena). Furthermore, the importance of earthworms for soil fertility in the Nilotic valley was recognized to such an extent that Cleopatra (69-30 BC) decreed the earthworm a sacred animal, to be revered and protected by all her subjects. Egyptians were forbidden to remove them from the land, and farmers were not to trouble the worms for fear of stunting the renowned fertility of the Nilotic valley's soil.

From Antiquity to Darwin's time, not much information is available on earthworms, excepting a few anecdotal descriptions of uses, activity, and taxonomic aspects. One notable exception is that of Vicenzo Tanara, an Italian agronomist who declared in his famous book *L'economia del cittadino in villa* (Tanara, 1651), that earthworms were important indicators of fertile soil, and that this could be easily observed by the flocks of birds that appeared after soil seedbed preparation. However, throughout much of the 19th century and even the beginning of the 20th century, most persons considered earthworms garden pests, undesirable animals that needed elimination from the soil. For instance, in Rozier's (1805) Complete Course of Agriculture (Vol. 11, supplement, p. 53), representing the synthesis of knowledge on the subject at the time, the category "worm" presents a long article dealing mostly with the pest aspect of earthworms, and the means to eliminate these noxious animals: "Every cultivator … knows the damage that worms do to seeds… it is thus advantageous to know the means to destroy them."

And he thus provides a list of ways in which earthworms can be removed from the soil (and destroyed). In the same article, however, Rozier also mentions some beneficial uses of earthworms, such as for certain medicines, food for certain Indian peoples and, of course, their role as fish-bait. Before Darwin, the importance of earthworms

[5] Most of the information given in this article comes from Brown et al., 2003. The detailed bibliography can be seen in this review article.

in soil fertility was thus not considered, except by very few naturalists. One of them was Gilbert White who, over thirty years before Darwin's birth (1789) published *The natural history of Selborne* and wrote:

> "Worms seem to be the great promoters of vegetation, which would proceed but lamely without them, by boring, perforating, and loosening the soil and rendering it pervious to rains and the fibers of plants, by throwing up such infinite numbers of lumps of earth called worm-casts which, being their excrement, is a manure for grain and grass… Gardeners and farmers express their detestation of worms; the former because they render their walks unsightly, and make them much work; and the latter because, as they think, worms eat their green corn. But these men would find that the earth without worms would soon become cold, hard-bound, and void of fermentation, and consequently sterile" (in *Letter to the Honorable Daines Barrington*, May 20, 1777).

But this passage seems to have been overlooked by Darwin, who did not mention it in his book. Darwin did not know also of the work published by P.E. Müller in 1878, which also attributed earthworm's importance for soil fertility and humus formation.

Nonetheless, following the publication of 'Worms' by Darwin, several scientists such as the famous soil physicist, the German E. Wollny, were quick (in 1882) to criticize it and promptly began research to disprove Darwin's statements. However (fortunately) Wollny's results (published in 1890) proved Darwin was correct, showing positive effects of earthworms on yields of various plant species grown in pots. Since then, thousands of papers have been published on the topic, and the number continues to increase exponentially. These papers confirm many of the main statements of Darwin, although in a few cases they also show some of the shortcomings of his work (Feller et al. 2003).

Today it is well recognized that earthworms are important agents for the maintenance of important soil properties (chemical, physical and biological ones) and for the provision of ecosystem services.

The resurgence of interest in organic farming and more generally in "agroecology agriculture" (in which earthworms play a more important role influencing soil fertility) in recent years has brought Darwin's book and earthworms back into the limelight. The ideas expressed in Darwin's book, such as

> "Worms have played a more important part in the history of the world than most persons would at first suppose" (p. 145),

have even been used in popular comic strips (see e.g., cartoons of Richer de Forges et al. 2010, 2012 and Larson, 1998) and in science fiction as the famous ecological novel *Dune* by Frank Herbert in 1965.

To most people, especially in Darwin's day (and even to many people today), earthworms were merely unpleasant, slimy, ugly, blind, deaf and senseless animals, of little use except for fish-bait, and a general nuisance, particularly because of their 'unsightly' surface castings (Feller et al. 2003). Darwin restored a noble and useful character to earthworms, attributing to them intelligence and benevolence.

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**Links between soil science, indigenous landscape knowledge and society – examples from New Zealand and Australia**


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The New Zealand Maori have many ancient legends linking their gods, great warriors and monsters to the geological origins of the wild and beautiful landscapes of the 'Shaky Isles'. The one which is most dramatic is that of the origins of


*Illustration 1. A New Zealand map.*

*Illustration 2. The Maori perception of the two main New Zealand islands.*

the two main islands of New Zealand (NZ). If you care to examine a map of the North Island (NI) of NZ (see illustration 1) you might imagine it as a giant fish swimming south, the open mouth of this fish being Wellington harbor (Te Whanganui a Tara) and the South Island (SI) a great fishing canoe (Waka) from which the demi-god Maui is said to have hauled the island up from the dark sea in his canoe, it being the South Island. If you examine a map of the SI you can see it is indeed somewhat 'canoe-shaped' with the oars plunged into the sea on its east coast these representing the extinct volcanoes of Banks Peninsula (Akaroa) and the Dunedin headland. Stewart Island, to the south, represents the anchor stabilising the canoe as the great fish was hauled from the sea. The long sandy spit of Cape Farewell on the NW tip of the SI forms the fishing line on which the great fish (NI) was caught (illustrations 1 and 2). The rugged topography of the NI was formed when Maui's brothers began arguing over the possession of the new land (the fish) and beat it with their weapons creating valleys and mountains.

This wonderful story tells us of the Maori's knowledge of up-faulting tectonics and raised marine rock types common in the NI and also of the very precise shape of both the South and North Islands. And possibly even that they are moving plates (canoe) on a molten ocean of liquid mantle? Perhaps they were the first to understand land movement and faulting as Maui's story shows us.

Another Maori story explains energetically the origins of Wellington harbor which has formed due to progressive uplift that has created an isthmus to a former barrier island (Miramar). This story tells of two sea monsters or taniwha, Whataitai and Ngake, who inhabited a great lake, one day they quarreled and fought, when each taniwha tried to escape the lake to the ocean (Cook Strait) beyond. Only Ngake made it by swimming at full speed from the north to the south side of the lake crashing through the rocks at Seatoun and out in to the strait and ocean creating the modern harbor entrance. Whataitai was trapped by the receding lake levels and became stranded in the shallows. He lay there for many generations before being lifted high on to the land by a great earthquake forming the hills around the harbor at Mt Victoria.

Many similar Maori legends explain the tectonism and volcanism of other parts of NZ and the dramatic landscapes, often shaking, land sliding, flooding and erupting around them.

Many indigenous Australian stories are still sacred and kept secret; they can't be told to outsiders

*Illustration 3. 'Spirit of the Land, Painted with the Land'. Colin Clayton, painting, 1998*

least they lose their power or scared knowledge. However some can be told and my favorite Australian indigenous landscape story is more closely related to soil distribution than the NZ tales I share above. Indeed it is a Tasmanian Aboriginal legend and tells of the distribution of Red Ferrosols (Australian classification) across the island. In this tale the great ochre pits in the Gog Range are the scene of a theft of precious red ochre, the life blood colour for Aboriginal art and body painting. However the theft is spotted and the thief perused by the keepers of the ochre pit. As they chase him across the island the thief tries to placate the pursuers by dropping lumps of the red ochre for them to stop and collect. But the red ochre forms irregular patches of ground and explains the spotted distribution of red basalt and dolerite derived Red Ferrosol soils around the island.

To celebrate this beautiful story I commissioned a painting called 'Spirit of the Land, Painted with the Land' using soil types from the University of Tasmania farm near Cambridge. The artist is Colin Clayton a fine arts student of the university (illustration 3). I guess I made an error as we did not use Red Ferrosol clays in the work as they were not present on the UTAS farm. I would also prefer we commissioned a new work (or set of works) to be completed by an indigenous artist(s).

Currently in Tasmania we are trying to develop, with Soil Science Australia's assistance, a project which celebrates Aboriginal landscape story telling through the use of soil, ochre and other natural pigments. This project is titled 'E(ART)H Project' and interested readers can find out more at *www.earthproject.com.au*

# Activities of IUSS Working groups for IYS

## WG Cryosols: Soils in ice-cold environments

Cryosols (or Gelisols as they are defined in USDA Soil Taxonomy) are soils which contain ice or permafrost (temperatures below 0°C for at least two consecutive years). The cold climate has a dominant impact on soil formation and properties. Cryosols are found in the Arctic in Canada, Russia, Alaska, and Norway, as well as in Antarctica and some high altitude areas such as the Himalaya and the Tibet Plateau. Cryosols form on parent materials ranging from glacial tills through bedrock to organic peat materials. In the Arctic cryosols support a wide range of plant and animal life and they underpin important summer breeding grounds for many migratory birds. In the Antarctic plant life is much scarcer and limited to just two species of flowering plants that occur on the Antarctic Peninsula (the warmest and wettest region of Antarctica). Over much of the Antarctic continent plant life on cryosols is limited to occasional patches of mosses (where there is some liquid water available in the summer) and lichens that are tolerant of extreme cold and dry conditions.

The following websites have more detailed information about Cryosols or Gelisols:
*http://www.fao.org/docrep/003/y1899e/y1899e13.htm*
*http://www.isric.org/sites/default/files/major_soils_of_the_world/set10/cr/cryosol.pdf*
*http://www.britannica.com/EBchecked/topic/707513/Cryosol*
*http://en.wikipedia.org/wiki/Gelisol*

*Scientists studying soil in the Beardmore Glacier Region of Antarctica at about 85 °S (Photo: Errol Balks).*

Some Cryosols in Antarctica form in cold desert conditions where there is insufficient moisture to ice-cement the soil.

*Landscape where the predominant soils are Cryosols in the Northern Ural Mountains, Russia (Photo Megan Balks).*

*A cryoturbated Cryosol from Russia (Photo: George V. Matyshak).*

*A profile of a "dry-permafrost" cryosol in the McMurdo Dry Valleys region of Antarctica (Photo: Megan Balks).*

# Activities of National Soil Science Societies for IYS

## 1st South America Soil Judging Contest

*By Flavio Camargo [mailto:fcamargo@ufrgs.br]*

The 1st South America Soil Judging Contest took place at UFSM campus, Santa Maria, Brazil, May 7-8, 2015. The Pedology Group of the Department of Soil of the Federal University of Santa Maria, Brazil, with support from the Brazilian Soil Science Society (South Regional Center) and EMBRAPA carried out the first Brazilian soil identification competition. Students from various institutions in southern Brazil showed their skills in identifying typical soils of the central region of the Southern state of Brazilon the campus of UFSM, May 7-8, 2015. This type of event, which has already been organized in other countries for a long time, aims to integrate students, teachers and researchers from the Pedology area (responsible for soil genesis studies, identification, collection and classification) through challenging and dynamic activities outside the classroom, and to make young soil scientists aware of the soil characteristics of the region. The competition, which was coordinated by professors of the Department of Soil, namely Fabricio de Araújo Pedron, Ricardo Bergamo Schenato Simon and Ricardo Diniz Dalmolin, was a success. A future competition is already scheduled for 2016, during the XI South Brazilian Meeting of Soil Science.

## Activities of Dokuchaev Soil Science Society (DSSS) in Russia for IYS 2015

Many conferences on soil science and propagation of soil knowledge to society were organized within the scope of the IYS (2015).The main soil forums held in Russia are enumerated here in their time sequence.

XVIII Dokuchaev's conference for young scientists 'Soil degradation and food security of Russia', March 2-5, 2015, St. Petersburg, Russia (cf IUSS Bulletin No. 126, P.27-28)

The Interregional Conference "Soils of arid territories in the south of Central Siberia: contribution of scientists from Lomonosov Moscow State University into research, setting, reclamation, conservation and sustainable development of lands" was held at the Research Institute of Agricultural Problems in Khakassia in cooperation withthe Sukachev Institute of Forest, Siberian Branch of Russian Academy of Sciences, Soil Science Faculty of Lomonosov Moscow State University, Khakassia, Tyva and Krasnoyarsk Regional Divisions of DSSS, Abakan, Republic Khakassia, Russia, July 29-31, 2015. The conference President was Prof. Vadim Savostiyanov (Research Institute of Agricultural Problems in Khakassia).

The 2nd International Conference "Modern Research in Natural Sciences" was held at the Far-Eastern Federal University with support of the Far-Eastern Regional Division of Dokuchaev Soil Science Society, Vladivostok, Russia, August 26 – September 5, 2015. The President of the Conference was Prof. Andrey Adrianov (Far-Eastern Federal University, Vladivostok), the Vice-President – Prof. Alexander Makeev, Lomonosov Moscow State University, Moscow, Russia.

All-Russian Conference with international participation "Soils of Cold Regions: genesis, geography, ecology" was held at the Institute of General and Experimental Biology (IGEB) Siberian Branch of RAS in cooperation with the Federal Agency of Sci-

entific Organizations, Institute of Physico-chemical and Biological Problems of Soil Science (IPCBPSS) RAS, Buryatia Scientific Center SB RAS, Buryatia Regional Division of DSSS, Paleopedology Commission of the IUSS, Ulan-Ude, Republic Buryatia, Russia, August 31 - September 9, 2015.
Presidents of the conference were Prof. Leonid Ubugunov (IGEB SD RAS) and Prof. Valery Kudeyarov (IPCBPSS RAS). The Chair of the Organizing Committee was Prof. Nimazhap Badmaev (IGEB SD RAS). Scientific secretaries were Dr. Larisa Balsanova and Dr. Irina Lavrenteva (IGEB SD RAS).
Plenary session was dedicated to Prof. Oleg Makeev (100th anniversary), his scientific activities and biography.
The main topics of the scientific symposia were the following: (1) Genesis, geography and classification of soils in cold regions; (2) Paleocryogenic epochs as stages of extreme soil formation in the course of pedosphere evolution; (3) Climate and hydrothermal regimes of cold soils; (4) Physical, chemical and mineralogical properties of cold soils; (5) Microbiology, biogeochemistry and ecology of soils and landscapes of cold regions; (6) Land use and soil conservation in cold regions.

The 4th Forest Soil Science Conference "Fundamental and Applied Aspects of Forest Soil Science" with International Participation was organized by the Division of Biological Sciences of the Russian Academy of Sciences, Dokuchaev Soil Science Society, Ministry of Natural Resources of Komi Republic, with organizing support from the Center on Problems of Forest Ecology and Productivity, Lomonosov Moscow State University, Syktyvkar, Russia, September 14-19, 2015.
The main topics of the symposiums were: (1) Diagnostics for forest soil taxonomy: genesis, processes, morphology (Convener – Prof. Maria Gerasimova); (2) Biogeochemical cycles and Sustainability of Forest Ecosystems: field research and modeling (Conveners – Prof. Alexander Komarov, Prof. Kapitolina Bobkova); (3) Structure and functions of soil biota in forest ecosystems (Convener – Prof. Bella Striganova); (4) Organic matter in forest soils (Convener – Prof. Evgeny Milanovskiy, Lomonosov Moscow State University); (5) Anthropogenic changes in forest soils (Convener – Prof. Nataliya. Lukina).

The International Conference "Role of soils in biosphere and human life" was held at the Faculty of Soil Science in cooperation with the Institute of Ecological Soil Science, Lomonosov Moscow State University, DSSS, Russian Geographical Society, Federal Agency of Scientific Organizations, Division of Biological Sciences of RAS, Scientific Council on Soil Science of RAS, Dokuchaev Soil Science Institute (DSSI), IPCBPSS RAS, Severtsev Institute of Ecology and Evolution Problems (SIEEP) RAS, Moscow, Russia, October 5-7, 2015.
The conference president was the Rector of Lomonosov Moscow State University Academic Victor Sadovnichiy (MSU), Vice-Presidents were Prof. Sergey Shoba (MSU), Prof. Andrey Ivanov (DSSI), Prof. Dmitry Pavlov (SIEEP RAS), Prof. Valery Kudeyarov (IPCBPSS RAS)
The conference was dedicated to the 100th anniversary of Academic Gleb Dobrovolsky, his scientific activities, diverse contributions to soil science and biography.
There were three symposia based on the ideas of Prof. Gleb Dobrovolskiy in soil science.
First symposium "Soil resources: evaluation of status and rational use" comprised the following issues: (1) Lands of Russia and evaluation of soil resource potential; (2) Legislative aspects of soil use and conservation; (3) Economics of land use and environmental services of soils; (4) Soil degradation and sustainable land use.
Second symposium "Ecological functions of soils in biosphere" comprised the following issues: (1) Role of soils in maintenance of Earth's biodiversity; (2) Role of soils in sustainable functioning of hydrosphere and atmosphere; (3) Carbon fluxes and role of organic matter in biosphere; (4) Biodiagnostics as a tool for environmental evaluation of soils.
Third symposium "Soils and civilization" comprised the following issues: (1) Soil fertility and strategy of food security; (2) Soil as a source of paleoenvironmental and archeological information; (3) Soils and Society; (4) Ecological education and popularization of knowledge about soils.

All-Russian Conference "Soil is a Mirror and Memory of Landscape" was organized by the Institute of Natural Sciences at Vyatka State Humanitarian University (VSHU), Vyatka State Agricultural Academy, Kirov Regional Division of Russian Geographic Society, Kirov Regional Division of Dokuchaev Soil Science Society, Kirov, Russia, October 8-9, 2015 2015. The President of the Conference was Prof. Valery Yungblyud (VSHU, Kirov), the Vice-President – Prof. Alexey Prokashev (VSHU, Kirov).

The main topics of several symposia were: (1) Modern conceptual and methodological problems of soil science; (2) Regional researches on soil genesis and soil evolution; (3) Soil classification; geography of soils, soil cover patterns; (4) Agricultural soil science, agricultural chemistry, agronomy, soil management and reclamation, soil fertility; (5) Regional Red Books of Soils; (6) Soil mapping, evaluation of land resources; (7) Teaching of soil science and soil geography.

The 4th Conference "Evolution and Degradation of the Soil Cover" was held at the Stavropol State Agrarian University in cooperation with the Stavropol Research Institute of Agriculture, State Center of Agricultural Chemistry Survey "Stavropolsky", Ministry of Agriculture of Russian Federation, Ministry of Agriculture of Stavropol krai, DSSS, Russian Ecological Academy, Kuban State Agrarian University, Southern Federal University, Stavropol, Russia, October 13-15, 2015.
The President of conference was Prof. Vladimir Trukhachev (Stavropol State Agrarian University)
The main topics of the conference were (1) Theory of soil evolution and soil degradation; (2) Soil contamination by heavy metals and pesticides; (3) Soil erosion and deflation; (4) Soil overmoistening, salinity and sodicity; (5) Farming practices; (6) Soil biology.

10th International Eurasian Soil Science Congress "Soil Science in the International Year of Soils 2015", October 19-23, 2015, Sochi, Russia.
The 10th International Eurasian Soil Science Congress "Soil Science in the International Year of Soils 2015" was held in Sochi, Russia, October 19-23, 2015. It was organized by the Dokuchaev Soil Science Society in cooperation with the Federation of Eurasian Soil Science Societies, the Lomonosov Moscow State University and Dokuchaev Soil Science Institute, and was sponsored by the Russian Foundation for Basic Research.
The President of the Congress was Prof. Evgeny Shein (Lomonosov Moscow State University (MSU), Soil Science Faculty, Russia), the Vice-President – Prof. Vladimir Goncharov (MSU), the Scientific Secretary of the Congress – Prof. Aminat Umarova (MSU), The Secretary – Dr. Dolgor Khaydapova (MSU).
128 soil scientists from Azerbaijan, China, Croatia, Hungary, Iran, Kazakhstan, Poland, Portugal, Russia, Turkey, USA, Uzbekistan took part in the Congress.
The congress program comprised

- Plenary lectures (moderator - Evgeny Shein, MSU, Russia),
- Section 1 - Soil Biology and Biochemistry, Soil Health and Quality (6 oral and 6 posters, moderator – Nadezhda Verkhovtseva, MSU, Russia),
- Section 2 - Soil Physics, Soil Management and Reclamation (18 oral and 22 posters, moderator – Galina Stulina, Scientific-Information Center of the Interstate Coordination Water Commission of Central Asia, Tashkent, Uzbekistan),
- Section 3 - Soil Chemistry, Soil Pollution and Remediation (12 oral and 10 posters, moderator – David Pinskiy, Institute of Physico-chemical and Biological Problems in Soil Science, Pushchino, Russia),
- Section 4 - Soil Fertility, Plant Nutrition and Fertilization (6 oral and 17 posters, moderator – Gennady Glazunov, MSU, Moscow, Russia),
- Section 5 - Soil Genesis, Classification and Mapping, Geostatistics, Remote Sensing and GIS (8 oral and 3 posters, moderator – Nikolay Khitrov, Dokuchaev Soil Science Institute, Moscow, Russia),
- Round table "Food security and degradation of soils" (moderator – Pavel Krasilnikov, MSU, Moscow, Russia)
- Field excursion "Soils of the Caucasus Black Sea coast and the cultivation problems of fruit and ornamental crops" at the experimental station of the All-Russian Research Institute of Floriculture and Subtropical Crops, Sochi.
- Topics of plenary lectures were
- Soil Organic Matter: New Paradigm is Needed, by Nicolay Panikov, Dept. of Immunology & Inf. Diseases, Harvard School of Public Health, US;
- Soil structure stability and erosion in a semi-arid agro-ecosystem, by Amrakh Mamedov, Institute of Soil Science & Agrochemistry, and Institute of Botany, ANAS, Baku, Azerbaijan;
- Physical, Chemical and Biological Attributes in Soil Quality, by Gülser Coşkun, Ondokuz Mayıs University, Faculty of Agriculture, Department of Soil Science and Plant Nutrition, Samsun, Turkey;
- Food Security and Land Degradation (scientific introduction to the roundtable), by Pavel Krasilnikov, MSU, Moscow, Russia.

All the participants of the Congress noted a consistently high level, greater interest and willingness to share their views, with new data and procedures for the meetings, excursions, during the discussion of poster papers.
The situation was extremely friendly and joyful. A reference for photos is:
*https://cloud.mail.ru/public/KUVZ/ZZ8GKrFpe*

National Conference with International Participation and School of Young Scientists on "Modern methods of investigation of soils and soil cover", November 9-11, 2015, V.V. Dokuchaev Soil Science Institute, Moscow, Russia (special topic).
National Conference with International Participation and School of Young Scientists on "Modern methods of investigation of soils and soil cover" was held at the V.V. Dokuchaev Soil Science Institute, Moscow, Russia, November 9-11, 2015, sponsored by the Russian Foundation for Basic Research and organized by V.V. Dokuchaev Soil Science Institute and Dokuchaev Soil Science Society of Russia.
The conference was attended by leading scientists, Academics, Corresponding Members, Doctors of Sciences, professors and young scientists from different research institutes and universities, members of the business community, suppliers of modern appliances and equipment. The conference gathered more than 100 people: participants and guests. 74 oral reports of employees from 29 scientific organizations, universities and businesses were presented.
On the first day of the conference (November 9) plenary reports were made on conceptual and methodological aspects of the use of modern instruments and equipment for soil research in the fields of physical chemistry and chemistry, physics, organic matter studies, molecular genetic research of microbial communities, micromorphology, mapping and monitoring, soil management and protection.
On the second day the following breakout sessions took place:
Section 1. Modern methods of studying the content and forms of chemical elements in soils: prospects and limitations.
Section 2. New technologies and methods for the study of soil physical properties.
Section 3. Soil organic matter, humus compounds, organo-mineral interactions in soils and methods of their study. Application of molecular genetic methods for soil microbial communities and the prospects for use of their results.
Section 4. Methods of micromorphology and mineralogy of soils.
Section 5. New in digital soil mapping. Regional inventories of soil resources and land cadastral valuation system USRSR (Unified State Register of Soil Resources).
On the same day, and on November 11, the School for Young Scientists took place. Topical issues of the use of modern methods of soil research were discussed.
Diplomas for the best paper among young scientists and certificates of short-term professional conference participants who have completed the master class were presented; the Resolution of the Conference was adopted at the closing session of the conference.
The conference participants unanimously noted that the modern physical and technical basis is an important component for the positioning of soil science at the international level, participation in the formation of the global trend of development and its impact on the development trend of agricultural production.

All-Russian Conference "Soil Resources and Problems of Food Security" was held at the Geology Institute (GI) of Dagestan Scientific Center of Russian Academy of Sciences (DSC RAS) in cooperation with Caspian Institute of Bioresources (CIB) of DSC RAS, Dagestan State University (DSU), Dagestan Regional Division of DSSS, Makhachkala, Republic Dagestan, Russia, December 4-6, 2015.
Conference Presidents: Prof. Sergey Shoba (MSU), Prof. Murtazali Rabadanov (DSU), Prof. Vasiliy Cherkashin (GI DSC RAS), Prof. Magomed-Rasul Magomedov (CIB DSC RAS), Scientific secretaries – Dr. Surkhay Mamaev (GI DSC RAS) and Dr. Akhmed Biarslanov (CIB DSC RAS).
The topics of symposia: (1) Modern state of soil resources and their role in food security; (2) Anthropogenic impact on soil cover in arid lands; (2) Digital soil mapping; (4) Biogeography, pedodiversity and biodiversity of arid lands.
Web-site about conference is:
*http://www.igdncran.ru*

Besides the soil conferences and congress other forms of activities took place in Russia for the International Year of Soils.

Section of Agricultural Sciences in the Central Club of Scientists RAS (Chair – Prof. Nikolay Khitrov, DSSI, Moscow) organized 5 public lectures on several problems of study and use of soils. They are as follows:

- Prof. Galina Koptsyk (MSU) Problems and perspectives of remediation of soils contaminated by heavy metals, January15, 2015;
- Dr. Olga Rukhovich (Pryanishnikov All-Russian Research Institute of Agrochemistry, Moscow) Models of natural factors impact on spatial distribution of cereal crop, February 9, 2015;

- Dr. Maria Bronnikova (Institute of Geography RAS, Moscow) Cryoaridic soils and their neoformations as "archive" of Holocene natural changes in intermontane depressions of South-Eastern Altay, March 12, 2015;
- Prof. Petr Sapozhnikov (MSU) and Dr. Alexander Ogleznev (DSSI) Informative resource about soils is a base for state cadastral evaluation of agricultural lands, April 6, 2015;
- Prof. Vladimir Romanenkov (Pryanishnikov All-Russian Research Institute of Agrochemistry, Moscow) Organic carbon dynamics modelling and evaluation of possibility to manage carbon storage in plowed soils, October 12, 2015.

Khakassia Regional Division of DSSS held two exhibitions. The first exposition "Soil is a base of life on the Earth" was held at Minusinsk Interregional N.M. Martanov Museum of local lore in January 2015. It comprised monoliths of main soils typical of the south of Middle Siberia, photos of landscapes, books about soils and their role in nature and human life. Drs. Ludmila Ermolaeva, Nataliya Soldatova, Nataliya Kutkina and Inna Eremina presented public lectures about advances of soil science and sustainable agriculture. The second exposition "Soil is a base of agriculture" was held at the National N.G. Domozhakov Library of the Republic Khakassia in Abakan in March, 2015. It comprised books about soils of Khakassia and adjacent regions, photos and brief biographies of soil scientists. Public lectures about the role of soils in sustainable agriculture were presented by Drs. Nadezhda Marakova, Tatiana Kyzyngasheva and Nataliya Kutkina.

Ulyanovsk Regional Division of DSSS opened A.N. Panasenko soil museum on February 4, 2015 at Ulyanovsk State P.A. Stolypin Academy of Agriculture. More information about this event can be fount at *http://agrovuz.ru/prepodavateljam/konferencii/item/8823-ugskha-otkryt-pochvennyui-muzeui-imeni-a-panasenko*

## Activities of the Egyptian Soil Science Society (ESSS) for IYS

The Egyptian Soil Science Society was established in1950. Member experiences covering the areas of soil and water sciences as well as the environment from all aspects include:

1. Pedology of soils and include the framework of inventory and land classification and mapping of topography, soil, agricultural and remote sensing.
2. Chemistry and mineralogy of soils.
3. The nature of the soil and water relationships which includes studies of irrigation and field drainage.
4. Soil fertility and plant nutrition including studies on fertilizers and fertilization.
5. Microbiology and biogeochemistry of trace elements in the rhizosphere.
6. Techniques of soil including studies of land reclamation and soil conservation.

To celebrate the International Year of Soils, several activities were carried out including the following:

1. The main symposium for ESSS, entitled **"Healthy Soils for a Healthy Life", October 12-13, 2015, SWERI, ARC, Giza, Egypt**.
   More details can be seen from the photos below and the following link: *http://www.esss.org.eg/Symposium%20of%20ESSS%20.html*

*Symposium of ESSS*

2. Symposium on "**Climate changes and water resources in Egypt**" Kafrelsheikh, Egypt which took place 30 November 2015, as shown in these photos:

3. The Soil sciences department at Cairo University organized a special celebration of the World Soil Day on the first of December 2015 by presenting the movie **"Symphony of the soil"** as depicted in the following photos:

4. Symposium on World Soil Day and workshop on "**The climate changes: its risks and mitigations**" held at Mansoura Uni., Faculty of Agriculture on December 5, 2015. More details can be seen in these photos and the following link: *http://agrfac.mans.edu.eg/en*

5. Symposium on the World Soil Day and workshop on "**The climate changes and its effects on the agricultural production**" held in Ain Shams University, Faculty of Agriculture on December 6, 2015.

6. The 12th International Conference of ESSS (ESSS 2016): **"Development of Water and Soil Resources: Challenges and Solutions"** from **7-9 March 2016, Ismailia, Egypt**
   More details can be found at:
   *http://www.esss.org.eg/second%20ann%20of-soil.html*

7. The 1st International Conference on Advances in Soil Science, **Alexandria /Egypt on May 2-5, 2016**
   More details can be found at:
   *http://icass-eg.com/*

**Soil message:**
Several messages can be presented here, but the most important one is:
Soil is the main source of our food, feed, fuel and fiber.

For more information contact:
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## The Latin American Soil Science Society and the International Year of Soils 2015

The 19 societies that form the Latin American Soil Science Society (SLCS) have launched several activities during the International Year of Soils 2015.

In **Argentina** a Contest of Murals for agricultural school students "Paint the soil" (Pintemos el Suelo), was organized by the Argentinian Soil Science Association and FEDIAP. Moreover, from 11 to 13 November 2015 was held the Second National Teaching Meeting of Soil Science, and on 27- November 2015 the Seminar of Soil Physic, *http://www.suelos.org.ar,* took place.

*The photo shows the participants of the contest Paint the soil (Pintemos el Suelo), in Argentina.*

In **Brazil**, the Soil Governance Conference (Brasilia, DF, Brazil) took place from 25 to 27 April 2015 promoted by the Brazilian Federal Court of Accounts, with the support of the Brazilian Soil Embrapa Soils Science and Society (*www.sbcs.org.br*), where there are the activities programmed for the whole year.

In **Costa Rica** a Photo Contest for young adults, 13-18 years old, took place (*http://www.radio16.com/2015/01/26/concurso-de-fotografia-jovenes-capturaran-imagenes-de-suelos-ticos/*), a Lottery Ticket, and the VIII National Congress of Soil was held from 18 to 20 March, with the participation of about 250 professionals. Costa Rica plans to close the IYS with the activity "Hands to the ground" ("Manos al suelo"), with the aim to teach how to conserve 1 $m^2$ of soil.


*Lottery Coupon, Costa Rica.*

The Soil Science Society of **Cuba** organized a Phonebook 2015 International Year commemorative of the Soil, and in June the meeting of the Central America-Mexico-Caribbean Regional Alliance, took place in Havana,Cuba.


*Phonebook in Cuba, with information about the soil.*

**Ecuador** celebrated the IYS with the Symposium "The Soil and the Nutrition of Crops in Ecuador" (El Suelo y la Nutrición de Cultivos del Ecuador"), by the Instituto Nacional de Investigaciones, on May 20-21. On June 28 a Symposium on Soil Biology was held, coordined by the Pontificia Universidad Católica del Ecuador. On July (22-24) the VII Latin Congres of Agronomy was held, organized by the Centro de Investigación y Desarrollo del Ecuador. On 27 November 2015 the Jornadas del Año Internacional de los Suelos took place, organized by the Sociedad Ecuatoriana de la Ciencia del Suelo, INIAP, the Agencia de Aseguramiento de la Calidad del Agro and the International Plant Nutrition Institute. In addition, the book "Los Suelos del Ecuador", edited by J. Espinosa, J Moreno and G Bernal, was presented.

The Soil Science of Honduras celebrated the IYS with the Week of the Soil (*semanadelsuelo@zamorano.edu*), with distinguished experts and about 480 participants.

*Week of Soils, in Honduras. First meeting of soils, in Honduras.*

The Soil Science Society of **Mexico** organized several activities, such as 1) Contest of posters to the 2015 International Year of Soils (*http://slcs.org.mx/index.php/es/posters-ganadores-del-concurso-estudiantil-unam*); 2) Edition Calendar 2015 International Year of Soils; 3) Symposium "World Soil Day", organized by the National Autonomous University of Mexico (UNAM), Colegio Postgraduate and National Institute of Ecology and Climate Change. December 5 of 2014; 4) Delivery of Calendar "2015 International Year of Soils" and "Atlas of the Soils of Latin America and the Caribbean" in Cuautitlan FES-UNAM, February 18, 2015; 5) Symposium "The Geography of the International Year of Land". March 23, 2015,


*Atlas of the Soils of Latin America and the Caribbean" in Cuautitlan FES-UNAM, Mexico.*

organized by the Faculty of Philosophy and Letters, UNAM; 6) Soil, water, life. Supplement of the month "La Jornada Field No. 91 "20 pages devoted to the 2015 International Year of Soils. April 18, 2015. *http://issuu.com/la_jornada_del_campo*; 7) National Meeting of Teachers and Researchers of soil science. 18 to 19 of June; 8) National Alliance for the Soil. August 17, 2015. Palace Mining UNAM; 9) Symposium "Inorganic Chemistry in the International Year of Soils". 14 to 16 October 2015. UNAM FES-Cuautitlán; 10) University International Meeting of Soil Science. 4 to 10 October 2015. UNAM Campus Juriquilla; 11) Metropolitan Soil Science Symposium. October 19, 2015 FES-Zaragoza, UNAM.

*National Alliance for the Soil. August 17, 2015, Mexico.*

In **Puerto Rico** there was a poster competition "Suelos sanos para una vida sana" (*http://suelos2015.eea.uprm.edu/*).

In **El Salvador**a Forum on Soils and Landscapes in El Salvador was held in the Hotel Terrace on April 30, 2015.

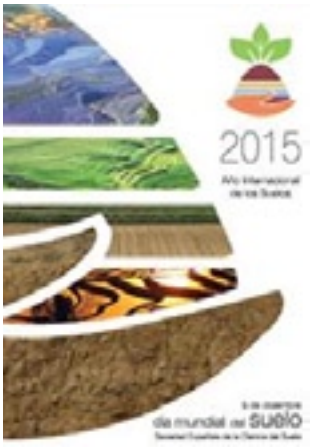

*The Soil Conservation Program - University of the Republic, the National Institute of Agricultural Research, and the Ministry of Livestock, Agriculture and Fisheries - was distinguished with an award of the Foundation "Lolita Rubial" Morosoli, December 2014, Uruguay.*

*First World Soil Day, in December of 2014, with school children between 5 and 12 years, in more than 5 schools, Venezuela.*

In **Uruguay**, scientists, policy influencers, investors, students and citizens met at Paysandú, Uruguay, on 28 and 29 October. "Seeking the path for sustainable intensification of agriculture" was the topic of this 4th biennial scientific and professional symposium organized by the Facultad de Agronomia of the University of Uruguay and the International Plant Nutrition Institute (IPNI). This year, the Symposium was jointly organized by the Soil Science Society of Uruguay (SUCS), the Minister of Livestock, Agriculture, and Fisheries of Uruguay (MGAP) & FAO, and the National Institute of Investigation in Agronomy (INIA) (*www.sucs.org.uy*). Also a Memorial Video of the International Year of Soils was presented at this symposium (*http://sucs.org.uy/index.php/ano-internacional-del-suelo*). A philatelic stamp in commemoration of the International Year of Soils was presented on December 3rd 2015. We also would like to mention that the Soil Conservation Program, - a joint program of the University of the Republic, the National Institute of Agricultural Research, and the Ministry of Livestock, Agriculture and Fisheries was distinguished with an award of the Foundation "Lolita Rubial" Morosoli. This Foundation expressed that the program has earned this distinction: "By studying the erosion problems in the country and to find ways to improve the use of agricultural soils, avoiding the most diverse difficulties, integrating academic information into practice".

In **Venezuela** the SVCS celebrated of the First World Soil Day, in December of 2014, with school children between 5 and 12 years in more than 5 schools. The meeting was held at the Museum of the National Land Agricultural Research Institute (INIA). Moreover, the XXI Congress of Soil Science, organized by the Universidad Nacional Experimental del Táchira, San Cristóbal Edo. Táchira, and the SVCS was held 24-27 November 2015.

A very remarkable action was performed by the Soil Science Society of **Spain** (SECS), demonstrating the high committment of its members to the mission of the IYS (*http://www.secs.com.es/?page_id=445*). The SECS and the Universitat of Lleida organized multiple activities throughout the country, where the participants were the protagonists: a Poster contest allusive to 2015 IYS, an international photography and video contest, a Comics contests, a Prize for the best article in 2015 in the media, and an itinerant exhibition of soils "Soils and Forest Biodiversity", and a documentary "The skin of the world". Further activities of the SECS were the emission of a coupon of the National Organization of Spain Blind (ONCE), with the logo of the IYS included in the coupon.

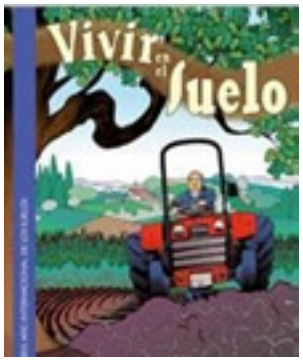



*Poster of the International Year of Soil*


*Official Stamp*


*Coupon of the National Organization of Spain Blind (ONCE), Spain.*

In addition, the Spanish Society of Soil Science (SECS-Territorial Delegation of Galicia) and the University of Santiago de Compostela published, in English language the comic "Living in the Soil" with the aim of raising awareness amongst young people of the importance of soils and the need to protect it and, in addition, to commemorate the International Year of Soil.




*Title page (in Spanish) of the comic "Living in the soil".*

Authors: Mª Pilar Jiménez Aleixandre, Estudio Tangaraño, M.T. Barral Silva y F. Díaz-Fierros V. 2015. Coordination: M. Díaz-Raviña
Both Spanish and English editions are available at the following website:
*http://www.suelos2015.es/materiales/comic/vivir-en-suelo*

*Activities in Spain*

One activity of the Latin American Soil Science Society (SLCS) was the publication of a Calendar for the 2015 International Year of the Soils:


## Malaysia - SOIL FUN RUN in conjuction with International Year of Soils 2015

The Malaysian Society of Soil Science with the collaboration of the Department of Agriculture Malaysia, conducted a SOIL FUN RUN on Saturday, 17 October 2015 starting 8.30am at the Universiti Putra Malaysia (UPM) campus. This run was aimed at creating awareness and understanding for the importance of soil in our daily lives and appreciates Mother Nature's finite resource. The run which was held at UPM, Malaysia's premiere agriculture university, enabled participants to enjoy the beautiful greeneries in the vicinity and at the same time understand about soil and its properties. There ware various stops along the run where the participants were exposed to various pieces of information on soils such as a soil profile, soil play etc. Participants were required to pass all these stations before completing the run.

## Activites of the New Zealand Society of Soil Science in the IYS

The new website of the New Zealand Society of Soil Science *http://ilovesoil.kiwi/* is now live - do check it out and forward links to anyone who may be interested. It has some great info about NZ soils and suggestions for soil activities that will inform and entertain.

IYS posters, brochures and stickers: See the NZ Society of Soil Sciences website *http://nzsss.science.org.nz/* to download kiwi style "Ilovesoils" logos and our IYS poster and brochures. Copies of stickers, posters and brochures are still available free from Megan Balks *m.balks@waikato.ac.nz*

The importance of soil science research in New Zealand is amply demonstrated by the wide range of soils related research that is currently being carried out at various institutions in the Canterbury region. A series of 10 weekly seminars in September, October and November this year seeks to highlight the scope and quality of this research.

Source: New Zealand Soil News - Newsletter of the New Zealand Society of Soil Science; ISSN 0545-7904 (Print), ISSN 1178-8968 (Online), Volume 63, Number 3, August 2015

## German Soil of the Year 2015: Surface Water Gley

The German Soil Science Society has designated Surface Water Gley as Soil of the Year 2015. A flyer with detailed information can be downloaded from the IUSS website: *http://www.iuss.org/index.php?article_id=21*

## SSSA (Soil Science Society of America): International Year of Soils

During the International Year of the Soils SSSA published monthly videos highlighting the importance of soils for mankind. These films were made available on youtube (the whole collection can be viewed at *https://www.youtube.com/playlist?list=PLZVYohuIygMqtilTezSHbzveYUj3WLjdm)* and some of them appeared in IUSS's monthly Alert (cf *Soils Protect the Natural Environment: Which soil is under your feet?* and *Soils and Climate*).

## Japanese Society of Soil Science and Plant Nutrition (JSSSPN)

*By Toru MATHO and Kazuyuki INUBUSHI, President and Vice-President of the Japanese Society of Soil Science and Plant Nutrition (JSSSPN) and Takashi KOSAKI, Chair of Division 3, IUSS.*

**September 9-11, 2015, Kyoto University, Kyoto**

Our Society (JSSSPN) will hold the *JSSSPN Annual Meeting* as a special meeting to celebrate IYS. More than 800 researchers will attend the meeting to make oral or poster presentation to deepen our understanding on a wide range of topics of the 9 divisions of the society: 1) soil physics, 2) soil chemistry and mineralogy, 3) soil biology, 4) plant nutrition, 5) soil genesis, classification and survey, 6) soil fertility, 7) fertilizers and soil amendments, 8) environment, and 9) socio-cultural soil science. In addition, it is our great pleasure that Professor Rattan Lal, President-elect of the IUSS, will deliver a keynote lecture with the title of "Soil and Sustainability" during this special meeting in the IYS.

**October 3, Yayoi Hall, University of Tokyo, Tokyo, Symposium 2015 "Soil, International Year of Soils and Agricultural Researches: A Bridge Connecting Society, Life and Environment"**

We will jointly organize *a symposium titled "International Year of Soils and Agricultural Researches: A Bridge Connecting Society, Life and Environment"* together with Association of Japanese Agricultural Scientific Societies. Seven out of 9 speakers are representing JSSSPN as well as other agricultural scientific societies and deliver lectures on the basic to up-to-date topics on the soils and surrounding agricultural sciences towards sustaining the planet Earth. The plenary lecture entitled "How do soils play a role in feeding 10 billion people in the world?" will be given by Prof. Takashi Kosaki, Past-President of JSSSPN and current Chair of Division 3, IUSS.

**December 5, 2015, Lecture Hall of Science Council of Japan, Tokyo, Special symposium "Soil, Land and Life"**

We will also hold *a special symposium entitled "Soil, Land and Life" to celebrate the IYS* on the World Soil Day of the IYS. Among the presenters of the symposium will be Mr. C.W. Nicol, a naturalist and a novelist, an environmental economist (tbd), Mr. Yoshitsugu Kuroda, a young leader of a Japanese agricultural cooperative association, and

Prof. Takashi Kosaki, a soil scientist and Chair of Division 3, IUSS. This will be a special event for all who are concerned with soils to commemorate the IYS and of course open to the public.

**Soil message**

In order to increase awareness and understanding of the importance of soil for food security and essential ecosystem functions, we must keep on sending to the public the following messages at the same time: “Soils sustain life” and “Soil resources are finite and thus should be treated as such”. Approach to the young generations would be especially important to continue and strengthen our activities in the future.

*http://jsspn.jp/Eng/index_eng.html*

# IYS Conference and Meeting reports

## IESP Workshop: "Soil – an Essential Resource", Frauenchiemsee, Germany, April 16-17, 2015

*By Kristina Schwarzer, IESP – International Expert Group on Earth System Preservation*

The international workshop "Soil – An Essential Resource" was held at the Benedictine abbey of Frauenwörth on the island Frauenchiemsee, Bavaria, Germany.
Organized by the "International Expert Group on Earth System Preservation" (IESP, *www.iesp.de*) and Prof. Kögel-Knabner from the Technische Universität München, a group of 45 well-known scientists, representatives of regulatory agencies, from NGOs, industry and media discussed about the challenges to implement strategies for the sustainable management and protection of soil resources.

Lectures and intensive discussions finally culminated in a significant declaration. This declaration highlights the importance of soil for life on earth and points out the imperative of policy, science and administration working together to make sure that soil is used wisely and protected effectively:

Soil, like water and air, is essential for life on earth. Soils have multiple natural functions and provide important ecosystem services, but there may be diverging interests in their use as a non-renewable resource by humans (e.g., for food production versus for urban infrastructures). These types of trade-offs need to be evaluated, considered and balanced towards a sustainable soil and land management. Public awareness for the importance to wisely using soils is growing, especially in the International Year of Soils 2015, but efforts need to be stepped up. Effective policy and governance requires an integrated knowledge of site-specific properties of soils and their function over the long-term.
Soils are at risk in many regions across the world. Land use change and inappropriate land use still remain to be the main drivers of desertification and increased erosion, deforestation, and salinization. Contamination and soil sealing in urban environments may endanger soil functions. The loss of arable land, soil fertility and soil biodiversity are significant problems, especially with regard to a burgeoning world population and the challenge for securing the global demand for food and biomass.

Protecting our soils is imperative and policy, science and administration need to work together and take forceful joint action to:

1. reduce the expansion of land for settlements and infrastructure. Measures to limit and minimize land consumption must be developed and need to take into account soil diversity.
2. implement and make obligatory, sustainable methods in agriculture and forestry that preserve soils. Most important in this context are the reduction of erosion and the decline in soil organic matter to preserve soil fertility. Minimum thresholds and standards for sustainable agriculture and forestry should be developed in the process of subsidy allocation.
3. avoid input of harmful compounds to soils from industrial production. Agricultural inputs such as pesticides and fertilizers should be applied judiciously with implementation of maximum permissible values where necessary.
4. protect bogs and wetlands because their soils are effective carbon sinks. Although these soils cover only 3-4 % of land surface, they contain about 20-30% of organic carbon sequestered globally. Thus, industrial use of peat and the drainage of peat soils and wetlands should be carefully considered.
5. improve financial and political support of interdisciplinary and international cooperation for the protection and restoration of soils. Some important topics for future work include: sustainable land use and the interdependence of soil diversity and function, agricultural practice and climate change.

## Agroecological assessment and functional-environmental optimization of soils and terrestrial ecosystems, Moscow, Russia, May 18-22, 2015

*By: Ivan I. Vasenev and Viacheslav I. Vasenev; Laboratory of agroecological monitoring, modeling and prediction of ecosystems; Russian Timiryazev State Agrarian University (RTSAU); Moscow. Russia*

1. Introduction
From 18 to 22 May 2015, the Department of Ecology and the Laboratory of agroecological moni-

toring, modeling and prediction of ecosystems of the Russian Timiryazev State Agrarian University (RTSAU) hosted the ESSC international conference "Agroecological assessment and functional-environmental optimization of soils and terrestrial ecosystems (AGROFOSTER)" in Moscow (Russia).
The Congress was attended by about 90 scientists from 26 countries of Europe, America, Asia and Africa to discuss the new advancements, achievements and challenges in soil and environmental sciences with especial attention on the impacts of soil erosion, degradation, sealing and pollution on the environment as well as adaptation of agricultural and urban ecosystems and land-use to dynamical environmental conditions at the multiple scales. The most recent research results were presented in contest of the development of sustainable and environmental-friendly anthropogenic soils and ecosystems, climate-smart agriculture and best management land-use practices
In the course of the Opening Ceremony several distinguished delegates delivered their opening speeches. These include representatives of scientific, governmental and business communities: C. Dazzi (President of the European Society for Soil Conservation), S. Shoba (President of the Dokuchaev Soil Science Society), V. Nechaev (Rector of RTSAU), Y. Dukhanin (Head of Land Policy and Crop Production Development Department of Moscow Regional government), J. Rubio (Vice Chair of the European Soil Bureau Network - ESBN (JRC, EC, M. Fatiev ("Moszelenstroy" JCS), M. Loktionov (EuroChem corporation), V. Naumov (Dean of Faculty of Soil Science, Agrochemistry and Ecology, RTSAU) and I. Vasenev (Chair of IUSS Commission 3.1, Department of Ecology, RTSAU and Organizing Committee).

The Conference was supported by the international and national scientific societies and research institutes (International Union of Soil Sciences - IUSS, European Society on Soil Conservation – ESSC, Dokuchaev Soil Science Society – DSSS, Russian Timiryazev State Agrarian University – RTSAU, Moscow State University – MSU and Peoples' Friendship University of Russia) and some private agencies working in environmental area (Moszelenstroy, EuroChem, BASF).
The main themes and subjects, that have been presented and discussed by the 4 invited lectures, the 56 oral presentations, the high number of posters presented in the thematic sessions and during the scientific excursion, are summarized in this report.

More information and a comprehensive program of the Conference can be found at:
*www.essc-congress2015.ru*

2. The scientific program
The Conference consisted of ten thematic main sessions, covering different aspects of monitoring, analysis and modeling soil processes, functions and services in natural, agricultural and urban ecosystems. Each session was convened by highly-recognized experts in the introduced fields. The scientific contributions were held by experienced scientists as well as young PhD candidates or researchers which actively enriched the well-balanced program of the Conference.
The Session #1 «Policies and strategies to support and maintain soil agroecological quality» was introduced by Prof. J. Rubio (Spain) and Prof. V. Kiryushin (Russia). The session included reports from the most competent experts in land-use policy and management, including the president of President of the Dokuchaev Soil Science Society Prod. S. Shoba, Vice-rector in science of RTSAY Prof. A. Golubev and one of the founders of Russian soil erosion school – Prof. M. Kuznetsov. The reports covered research and political issues in monitoring, assessment and management of soil resources.
The Session #2 «Soil quality agroecological assessment and modeling» was convened by Dr. J. Stoorvogel (Netherlands) and Prof. I. Vasenev (Russia). Several interesting case studies on the bioclimatic and anthropic impacts (sealing, irrigation and acidification) on soil quality were described for EU, European and Siberian parts of Russia. The Session #3 «Monitoring of the anthropogenic impacts, soil protection and risk assessment» was presented by Prof. S. Torma (Slovakia) and Prof. O. Makarov (Russia). Reports at the session mainly focused on soil erosion analysis at the multiple scales. Particular interest was also devoted to logging as an anthropogenic effect on soil functions. Dramatic decrease in soil organic carbon stocks was shown in result of logging practices in Central and Western Africa by Dr. T. Chiti. Parallel session #4 «Climate-smart agriculture: scientific, practical and political aspects», convened by Prof. R. Valentini (Italy) and Prof. V. Chernikov (Russia) focused on the theoretical and practical aspects of sustainable agriculture. A fascinating key note lecture «When is agriculture climate-smart? A call for proper soil management», given by J. Stoorvogel from Wageningen University was followed by two researches in agroecological analysis. The first one presented

temporal variability in green house gases (GHG) emissions measured by the first eddy-covariance station on croplands in Russia. The second one gave a very interesting study of life cycle analysis of meat production. The Session #5 «Soil ecological functions and ecosystem services: from concepts to application» was introduced by Dr. M. Samardzic (Serbia) and Dr. A. Yaroslavtsev (Russia). The session was focused on analysis and assessment of the key soil functions (i.e. transport, nutrient storage etc) in agro landscapes. Especial attention was given to the implementation of the soil functional analysis in lands-use planning and optimization. The Session #6 «Modeling and evaluation of the spatial-temporal variability of soil features and processes», convened by Prof. T. Dostal (Czech Republic) and Prof. E. Shein (Russia) highlighted the recent achievements in mapping and dynamic modelling of soil processes and threats. Diversity of case studies, including Tibet, Portugal, Eastern and Western Europe gave a clear message on the variability of natural and anthropogenically altered soils in space and time. The Session #7 «Environmental impact assessment and soil environmental quality certification» was introduced by J. Konecna (Czech Republic) and O. Nesterova (Russia). The reports at the session focused on anthropogenic and mainly technogenic effects on soil health and quality. The research presentations were complemented by a nice overview of teaching environmental impact assessment within the scope of Tempus STREAM project given by Dr. V. Semal. Important issues of ecotoxicology and biodegradation were discussed in the Session #8 «Bioremediation and reclamation of degraded or contaminated lands», convened by Dr. J. Vasin (Serbia) and Dr. V. Semal (Russia). The session covered a broad range of environmental problems, including soil pollution and reclamation, monitoring quality of hemozems (contaminated soils) and analysis of soil biological activity. A very interesting report was given by Dr. I. Andreeva on implementation of rapeseeds for biofuel production. Increasingly important issues of urbanization effect on soil quality were discussed at the Session #9 «Urban soils: from classification and monitoring to assessment of functions and services», introduced by O. Nesterova and V. Vasenev (both from Russia). The research presented at the session highlighted existing problems in environmental assessment and certification of urban soil's quality. Different approaches, including GHG emissions, measuring microbiological activity and analyzing soil physical properties were proposed for the environmental control and quantification of urban soils' processes and functions. Finally the Session #12 «Advances in monitoring, modeling

*Participants to the Conference banquet in front of the Kremlin.*

and prediction of C stocks and fluxes in natural and managed ecosystems», convened by Dr. T. Chiti (Italy) and Dr. A. Yaroslavtsev (Russia) gave the flour to experts in advanced methods of carbon assessments. High-detailed mapping, gamma-ray and Vis-NIR spectroscopy, chamber measurements of soil respiration and eddy covariance techniques to measure net ecosystem exchange were presented for the case studies in China, Italy and different bioclimatic zones of Russia.

The Conference was implemented by a considerable poster session, where a lot of young scientists' researches were presented. For an overview of the abstracts, either of presentations or poster sessions, use the above mentioned link of the Conference. The ESSC provided a grant to support the participation of young researchers to the Conference. During the Conference, Dr Sarah Buckingham (working at the Scotland's Rural College, Edinburgh, UK) was awarded the ESSC grant by the ESSC grant Commission.
At the end of the Conference the Prof. Carmelo Dazzi read the AGROFOSTER-ESSC International Conference resolution, which has been approved unanimously by the participants.

3. The social program
Besides to the intensive scientific activities, the social life of the participants of the congress was rich in remarkable events. The first day of the conference ended at the university restaurant, where an ice-breaking reception was organized. Local food and drinks complemented by a spectacular concert given by the student ensemble of folk dance and song set up the most friendly atmosphere, which remained till the end of the congress. The field scientific excursion took place at the third conference day. Participants of the tour had an opportunity to overview a nice catena of Albeluvisols (sod-podzolic soils) with different evidences of agricultural transformation. Field analysis and descriptions of soil profiles, kindly organized by a famous Russian soils-scientist Prof. I. Yashin were followed by interesting discussions, covering a vast range of issues from soil morphology to agrarian policy. After lunch at the local restaurant in a unique folk style, a visit to one of the first organic farms in Russia was organized. An interesting and detailed excursion given by the head manager of the farm was followed by a dinner with tasting of local honey and bread. On the way to the organic farm everyone could observe a famous Pereslavl-Zalesskiy settlement – one of key element of the Russian Golden Ring.
The primary results of the conferences were dis-

*Prof. I. Vasenev is awarded by Prof. C. Dazzi for his remarkable efforts in organization and hosting the ESSC congress.*

*During the field excursion.*

cussed during a congress banquet, organized in a beautiful 18th century hall of the Moscow State University historical building, located in front of the Kremlin. Variety of local food and a very nice string band was appreciated by the participants so much, that official ceremonies and award speeches left the flour for common dancing, in which all the fellow soil scientists succeeded.

## Soil Interfaces for Sustainable Development, McGill University, Montreal, Canada, 5-10 July, 2015

*By Joann Whalen, co-chair of the Soil Interfaces for Sustainable Development conference*

In celebration of the International Year of Soil, we organized "Soil Interfaces for Sustainable Development", a joint conference of three soil science societies:

- Commission 2.5 of the International Union of Soil Sciences, which holds an international symposia once every four years called "Interactions of Soil Minerals with Organic Components and Microorganisms (ISMOM)"
- Canadian Society of Soil Science
- Association québécoise des spécialistes en sciences du sol

The conference theme was emphasized by Dr. John Duxbury of Cornell University, who gave the plenary address on "Changing concepts of organo-mineral interactions in soils: Impacts on soil properties and sustainable development". He pointed out that our classic view of soil humic substances has evolved to include a much wider range of organic compounds and mineral phases, and dynamic interactions between soil fauna, microbes, plants and soil. He challenged the audience to consider how the emerging knowledge and new approaches to studying organo-mineral interactions be used to help meet demands for food production and security in an era of climate change, particularly in the tropical developing countries where most of the future growth in population will occur.

With more than 375 attendees from 26 countries, the conference was an opportunity for participants to showcase their work and network with scientists from the international milieu. Nearly 400 abstracts describing the state-of-the-art in soil science research were given as posters and oral presentations in 16 scientific sessions over a 5-day

*Dr. Inubushi speaking at the Gala Dinner.*

period. The topics covered in these scientific sessions were:

1. macro and micronutrient dynamics in soil,
2. dynamics of pollutants in soil,
3. soil microbiology,
4. organo-mineral interactions in soil,
5. analytical and methodological advances in soil study,
6. agricultural greenhouse gas emissions,
7. chemical and biological controls on organic phosphorus cycling in terrestrial and aquatic environments,
8. microbial provision of essential services across managed and natural ecosystems,
9. soil science education and outreach,
10. wetland soils in a changing climate,
11. proximal soil sensing,
12. spatial and temporal dynamics of soil processes and their interactions at multiple scales to study complex soil systems,
13. general soil science,
14. biochar in agriculture and environment,
15. management zones in precision agriculture, and
16. soils of natural, managed and intensive forest systems.

Each session featured an invited keynote speaker who provided an overview of recent developments and offered their perspectives on opportunities for advancing our knowledge further. Contributed oral and poster presentations in each session sparked discussion that often carried on during the breaks, which made for a lively, interesting and interactive conference.

*Conference participants at the Soil and Precision Agriculture field trip.*

A number of events and activities were organized by ISMOM, the national CSSS and the provincial AQSSS soil science societies during the Soil Interfaces for Sustainable Development conference. Everyone was welcome to participate. Some of these included:

- Pre-symposium short course, a 7-part lecture series on The Chemistry of Clay-Polymer Reactions was given by Dr. Benny K.G. Theng on Saturday-Sunday, July 4-5 (hosted by ISMOM)
- Compositional Data Analysis workshop to discuss methods for unbiased analysis of agronomic data, held on Sunday, July 5 (hosted by AQSSS)
- Soil Movie Night, a film series celebrating the International Year of Soils and accompanied by a panel discussion, snacks and prizes on Monday, July 6 (hosted by CSSS)
- The CSSS graduate students hosted a Trivia Night at McKibbin's Pub on Tuesday, July 7
- Back to Basics: Creating Paint from Soil workshop, a hands-on experience in soil-inspired art was led by artists Symeon van Donkelaar and Ken Van Rees on Thursday, July 9 (hosted by CSSS)
- Three field trips, including a touristic excursion and visits to commercial farms and research sites in the Montreal area took place on Thursday, July 9 (hosted by ISMOM, CSSS and AQSSS)

We were able to subsidize the participation of 11 graduate students at the conference through a McGill-led fundraising event, the Guy Mehuys Memorial Luncheon, held on Monday, July 6. Each of the recipients had their conference fees reduced by $300 and received an award certificate.

In honor of the founding organizer of the ISMOM international symposium, the inaugural Dr. Pan Ming Huang Award was given to Dr. Myrna Simpson of the University of Toronto (Canada) at the Gala Dinner

*Plenary speaker Dr. John Duxbury.*

*Presentation of the Dr. P.M. Huang Award at the Gala Dinner.*

*Conference participants enjoying the touristic excursion to the Montreal Botanical Gardens.*

on Wednesday, July 8. Dr. Simpson received a $1000 prize and an award certificate.

The Gala Dinner was also an opportunity for the CSSS to recognize a new Fellow, Dr. Noura Ziadi of Agriculture and Agri-Food Canada and for the AQSSS to name Dr. Jean Caron of Universite Laval as their new Fellow. Student members of CSSS and AQSSS participated in the competitions for the best oral and poster presentation awards, which were given at the Gala Dinner on Wednesday, July 8. A total of 12 prizes for excellent presentations were awarded.

The conference ended with a barbecue lunch and final words of farewell on Friday, July 10. It was a great event and an opportunity for Canadian soil scientists to keep in touch with colleagues and make new scientific friends who share our interest in soil science, from around the world.

## China celebrates International Year of Soils (IYS): "Soil and Eco-Environmental Security in China" High-Level Forum Held in Beijing, Beijing, 11-12 July, 2015

The year 2015 has been declared the International Year of Soils (IYS) by the 68th UN General Assembly. To positively respond to this global event, a High-level Forum on "Soil and eco-environmental security — IYS in China", was held from 11th to 12th July in China Hall of Science and Technology, Beijing. It was co-hosted by Chinese Academy of Sciences (CAS), China Association for Science and Technology, Ministry of Agriculture (MOA), and Ministry of Environmental Protection (MEP) and collaborated with Soil Science Society of China, Institute of Soil Science, Chinese Academy of Sciences, Chinese Association of Agricultural Science Societies, Institute of Policy and Management, Chinese Academy of Sciences. The forum was attended and addressed by ministers from CAS, MOA and MEP as well as by the Head of UNEP China Office. More than 150 participants from academic, governmental and industrial circles witnessed the event. The aim of the forum is to raise public awareness of the importance of soil resources for food security and environmental safety.

It has been noticed that, as addressed by the ministers, the Chinese government attaches great importance to soil protection emphasizing that cultivated land is the most valuable asset of the country, which is closely connected with national food security. The strictest rules should be implemented to protect the cultivated land just like to protect our pandas.


*A high-level dialogue from the Forum*

*The forum was chaired by Fang Xin, deputy secretary of the Communist Party of China Leading Group of the Chinese Academy of Sciences, at which Zhang Shigang, the China Coordinator of the UNEP and chairman of the UN commission on climate change and environmental projects, made his speech. Zhang Yaping, Vice president of Chinese Academy of Sciences; Zhang Taolin, vice minister of the Ministry of Agriculture; Li Ganjie, vice minister of the Ministry of Environmental Protection; Zhao Qiguo, Academician of soil science; Shen Renfang, president of Soil Science Society of China and general director of Institute of Soil Science, Chinese Academy of Sciences made plenary lectures.*

The official speeches were followed by a dialogue among eight eminent representatives from academic, governmental departments and industrial sectors. The legal, socio-economic and technological issues regarding agricultural soil protection and soil remediation were discussed. Audience also participated in the discussion with exchanges of ideas and opinions. More than ten experts from soil, land and environmental science fields were invited to this forum to share their latest research achievements and experiences.

The successful holding of the forum, which echoes the world-wide series of events celebrating IYS, further emphasizes the importance of soil and soil science in the development of national economy and ecology at multiple levels.

This forum has attract live broadcast and lasting coverage of more than 40 media including national agencies such as CCTV News, People's Daily online and Xinhua News.

*Special Issue on Soil and Eco-environmental Safety*

## International Course on Soil Science applied in Mexican tropic soils, UQRoo, Col.Pos. Tabasco and UNICACH, Mexico, 18-27 July, 2015

*By PhD. Patricia Fragoso Servón*

Earlier this year, from July 18 to 27 the international course on Soil Science applied to soils in the Mexican tropics with a duration of 80 hours was held. The course was shifting headquarters between the University of Quintana Roo (UQRoo), The Colegio de Posgraduados campus Tabasco (Col.Pos. Tabasco) and the University of Science and Arts of Chiapas (UNICACH). The opening of the course was conducted by Dr. Jaime Cuevas Dominguez, head of the Department of Sciences of the Sciences and Engineering Division at the University of Quintana Roo. Undergraduates and graduates from UQRoo, UNICACH, ECOSUR and staff from institutions such as INEGI and INIFAP signed up for the course.

The course instructors were: PhD. Patricia Fragoso Servón and PhD. (c) Alberto Pereira Corona (both University of Quintana Roo), PhD. Silvia Ramos Hernandez from the University of Science and Arts of Chiapas; PhD. Francisco Bautista Zúñiga from the National Autonomous University of México PhD. David Palma Lopez and PhD. Joel Zavala Cruz (both from the Colegio de Posgraduados campus Tabasco).

The course consisted of three parts, namely basic concepts, practical approaches and applications.
In the first part, conducted at the University of Quintana Roo from 18 to 20 July, the basics of soil were discussed, the importance of laboratory and field work, and recognizing the morphology of the soil profile for the dominant soil types in a tropical karst area of Quintana Roo. PhD. Patricia Fragoso and PhD. Silvia Ramos conducted training.

The second part was held at the Colegio de Posgraduados campus Tabasco from 21 to 23 July and corresponded to the practical part of the work with the profile description and soil classification. A visit was paid to the Research Laboratory. Fieldwork was conducted in the floodplain under supervision of PhD. David Palma López who has over 30 years of experience in soils of Tabasco.
PhD. Joel Zavala spoke about the geography of soils. In Tabasco Acrisols, Luvisols, Umbrisols and Gleysols in growing areas were described.

On July 24 PhD. Silvia Ramos showed tropical soils of Chiapas, and students had the opportunity to see Andosols and Acrisols. PhD. Francisco Bautista covered the last part, related to applications in the facilities of UNICAH, from 25 to 27 July. In this part we had the opportunity to use software and various applications for climate and soil analysis in the field and in cabinet.

The geography of soils together with the classification and soil genesis have resurfaced to understand environmental services provided by soils and to give them a sustainable management, an important point for ecological and territorial plan-


*PhD Palma and PhD Ramos describing the soil profile in Tabasco*


*At the University of Quintana Roo*

*PhD. Fragoso teaching the use of soil Calculator*

ning issue addressed by PhD (c) Alberto Pereira. The land use patterns are the technical knowledge of the application of the soil science in planning. The final part of the study of soils should be to incorporate this knowledge into education plans of the basic levels of formal education programs, like primary, secondary and high school.

Finally, we visited the facilities for soil studies and laboratories of this University. At 19 hours of July 27, the course was closed during the delivery of certificates and farewell toast.

We hope this is the first of many international soil science courses applied to tropical soils of Mexico. For the sake of soil science, the environment, the people and the country.

*Describing a soil profile in Quintana Roo*

## Workshop "Soils and Paleosols of Brazil", Campinas/Cananéia, 24-29 August 2015, with field trips in the states São Paulo and Minas Gerais, Brazil

**Joint IYS event of IUSS Commission 1.6 Palaeopedology and INQUA Project RAISIN**

Organizers: 1Alessandro Batezelli, 1Francisco Ladeira (1UNICAMP, Campinas, Brazil) and 2Daniela Sauer (2University of Göttingen, Germany)
Additional field trip leaders: 3Pedro H. de Moraes Martinez and 3Pablo Vidal Torrado (3USP, São Paulo, Brazil)
Programme:
Mon (24th Aug) - Tue (25th Aug): Pre-Workshop field trip to Ilha Comprida (São Paulo State, Brazil)
Wed (26th Aug): Presentations at Cananéia (São Paulo State)
Thu (27th Aug) - Fri (28th Aug): Post-Workshop field trips to Piracicaba and Itaqueri da Serra (São Paulo State) and Poços de Caldas (Minas Gerais)
Sat (29th Aug, 9 am to 11 am): Final discussion

**Pre-workshop excursion (24th to 25th August): Spatial variability of Podzols on Ilha Comprida influenced by soil age, relief and hydrology**

Ilha Comprida is a Holocene sandy barrier island. It is 3-5 km wide and 70 km long and stretches along the Cananéia-Iguape coastal plain. The climate is humid-tropical, with 2261 mm MAP. The island developed along a longitudinal vector (ENE-wards) and a transversal vector (SES-wards) into a long and narrow island running parallel to the coastline. Thus, in the cliff along the southern coast, the age of parent material decreases from West to East. Key topics that were discussed during the field trip were the soil-forming factors time and relief, with a special emphasis on hydrology. Soils in the inner part of the island are less well-drained than those exposed in the cliffs. The groundwater level under the swales between the beach ridges is high, and even peat formation can be observed in places. The soil profiles that are nowadays exposed in the cliffs must have started forming as inland soils, thus under less well-drained conditions, too. They got under better drainage conditions when the retreating cliff got closer and finally cut through them. Well-developed Podzols with Ortstein occur especially in the western zones of the island that are characterized by high beach ridges separated by narrow swales, whereas less developed hydromorphic Podzols and Histosols occur in areas with lower beach ridges and wider swales. Apparently, interflow running down from the beach ridges, carrying dissolved organic carbon (DOC) concentrates especially in narrow swales, leading to the formation of thick Ortstein horizons there. This effect is less pronounced in the wider, flatter ridge-swale systems further east.

*Western part of the south cliff of Ilha Comprida (stop 1): The sharp, even E/Bh boundary indicates Podzol formation under originally poorly drained conditions.*

**Take-home messages from the Ilha Comprida field trip**

- Hydrology and relief influence the spatial pattern of the morphology of Podzols at a similar order of magnitude as soil age!
- Spatial distribution of Ortstein is largely controlled by DOC fluxes leading to concentration and precipitation of organic compounds in lower landscape positions.
- Rates of soil formation: Under the given conditions (texture: 96-97% sand, climate: humid-tropical) mature Podzols may develop within about one thousand years.
- Micro-organisms eat up SOM of Bh horizons after aeration (regressive pedogenic process).

*Western part of the south cliff of Ilha Comprida (stop 1): The sharp, even E/Bh boundary indicates Podzol formation under originally poorly drained conditions. Below: Well-aerated Podzols like this one exposed in the west cliff (stop 3) show an irregular E/Bh boundary, with white tongues penetrating into the Bh. Tongues develop due to preferential flow, e.g. along former tree roots.*

- There is a close link between the geomorphological development of the island and the soils; erosion changes the hydrology, leads to aeration of soils that were formerly poorly drained
- Influence of parent material: very pure quartz sand together with high permeability of sandy material lead to rapid acidification.
- Vegetation is adapted to acid and nutrient-poor conditions; litter also contains only low amounts of bases and nutrients, resulting in incomplete decomposition.
- Podzols that developed under poorly drained conditions are characterized by a sharp, even E/Bh boundary; they lack a Bs horizon because iron has been reduced and removed under poorly drained conditions.

**Post-Workshop excursion (27th to 28th August): Paleosols in the Itaqueri Hill and Poços de Caldas region, including Ferricretes, Silcretes and Bauxite**

The first part of the post-workshop excursion focused on the typical palaeosol sequence of the Itaqueri Hill region, including a sequence of Ferralsol – ferricrete – silcrete. Several sites, where typical sections of this sequence are exposed, were visited. The first stop was a lookout point on the landscape that is strongly influenced by the ferricretes and silcretes that belong to this sequence, protecting the underlying parts of the landscape from erosion. At this stop also the yellow ferricrete, forming the surface at the lookout point, was examined. In addition, a profile exhibiting silicified root channels and a thick, dark red Ferralsol near Piracicaba were visited.

**Take-home messages from the post-workshop field trip**

- Many tropical soils developed in reworked soil sediments or in saprolite of older soils.
- The solum and saprolite of a tropical soil profile do not necessarily belong to the same cycle of soil formation; the solum may have formed much later, just representing the very last cycle of soil formation; an unknown number of soil formation cycles may not be recorded because its products have been completely eroded.
- Laterite formation does not occur at present in this region.
- Rates of soil formation are extremely difficult to assess in tropical landscapes.
- Tertiary paleosols having ferricretes are widespread in Brazil; they formed from different parent materials, through same processes; such soils do not form today in this region.
- Intensity of biological activity in Ferralsols (termites, ants, microorganisms) is important: slight changes will lead to a different profile.
- Factors that control iron oxide formation towards red (hematitic) soils vs. yellow (goethitic) soils:
  1. Strong micro-aggregation leads to good aeration and water permeability, hence to pedogenesis towards red soils; less permeable soils tend to be yellow.
  2. Hematite favors the development of stabile micro-aggregates more than goethite; thus, there is a positive feedback between micro-aggregate development and hematite formation (1⇔2).
  3. In addition, iron availability and original mineralogy are important.
  4. Aggregate formation moreover depends on drainage that in turn also depends on mineralogy and slope morphology.
  5. The same parent material under differing temperature conditions (tropical vs. subtropical) has produced Ferralsols, but with different mineralogy (tropical = hematite vs. subtropical = goethite).

## International Field Course and Soil Judging Contest, Hungary, 1-5 September 2015

*By Erika Michéli, Chair of IUSS Division 1, Chair of the Organizing Committee*

As part of the celebrations of the International Year of Soils (IYS), an International Field Course and Soil Judging Contest was organized by the International Union of Soil Sciences (IUSS), the Hungarian Soil Science Society and Szent István University, Hungary in partnership with the EU Joint Research Center, the Hungarian Academy of Sciences and Miskolc University, 1-5 September in Hungary.

Participants registered and came from all continents, 28 countries (*Afghanistan, Albania, Armenia, Australia, Bosnia and Herzegovina, Brazil, Croatia, Germany, Hungary, Japan, Kenya, Kosovo, Laos, Montenegro, Nigeria, Philippines, Rwanda, Serbia, South Africa, South-Korea, Spain, Sudan, Tajikistan, Tunisia, Turkey, Uganda, United Kingdom, USA).* Including the instructors and local supervisors 120 people participated in the event.

The four days of training included indoor and field sessions. An international team of soil experts gave an overview of site and profile descriptions and soil classification based on IUSS endorsed standards. Interpretation of soil properties and potential soil


*The participants of the International Field Course and Soil Judging Contest 1-5 September in Hungary*

functions were also a significant part of the topics. The locations of the field training covered a great variety of soil forming environments where local experts introduced the landscape and soil conditions with a focus on the contest themes.

The 16 teams included national and multinational teams from 3 to 5 members plus coaches. After visiting and investigating 10 soil profiles (including Anthrosols, Calcisols, Chernozems, Kastanozems, Phaeozems, Gleysols, Luvisols, Solonetz and Vertisols according to the WRB; Mollisols, Alfisols and Inceptisols – according to Soil Taxonomy) the contest was organized on the 5th day for teams and individuals. During the Soil Judging Contest the participants used their knowledge and practical skills to describe classify soils and interpret soil characteristics in the field. The contestants could not communicate to their coaches or other contestants.

Although the weather conditions were not favourable the teams and individuals were working hard and completed the contest in the rain in unforgettable spirit.

Evaluation was conducted for the teams, individuals and in an overall approach (considering team and individual scores of the team members).

The IUSS trophies that were introduced after the 1st international contest as part of the World Congress in Jeju, were handed to the winning team and the winning individual: the multinational African team "Hakuna Matata" and to Kirsten Pegues, USA team member.

The short lists of the top 3 are below, the details of the event and the results are available on the home page and facebook site of the International Field Course and Soil Judging Contest:

*http://soiljudging-iys2015.com/*

*https://www.facebook.com/soiljudging2015*

The organizers are thankful to all sponsors and assisting colleagues and congratulate to the winners and all participants!

**Team contest:**

1. **Hakuna Matata**, **Africa:** Ampurire Amias Aryampa (Uganda), Osman Gaafer Abdelgufar (Sudan), Nmerem Chukwuemeka Ezinwanne (Nigeria), Brenton Mabuza (South Africa)
2. **Team USA**, **United States of America**, Kristen Pegue, Erin Bush, Adrienne Nottingham, Stephen Geib
3. **H-Moles**, **Hungary**, Hella Fodor, Annamária Laborczi, Imola Hausz, Tamás Mester

**Individual contest:**

1. **Kristen Pegues**, USA
2. **Andrés García**, Spain
3. **Yves Uwiragiye**, Rwanda

**Overall contest:**

1. **Team USA**, **United States of America**, Stephen Geib, Kristen Pegue, Erin Bush, Adrienne Nottingham
2. **SECS**, **Spain**, Noemí Mateo, Irati Laiseca, Andrés García, Joaquín Cámara SECS
3. **H-Moles**, **Hungary**, Fodor Hella, Laborczi Annamária, Hausz Imola, Mester Tamás

Further to this successful event, Dr. John M. Galbraith, Assoc. Professor of Soil and Wetland Sciences from the Department of Crop & Soil Environmental Science at Virginia Tech, College of Agriculture and Life Sciences wrote the following letter of appreciation:

*"As Chair of Commission 1.4 Soil Classification, I would like to take this opportunity to acknowledge the excellent effort made by Div. 1 Chair*

*The winners: Team Hakuna Matata, Africa, Kristen Pegues and coach Joey Shaw, Team USA*

*Erika Michéli and her organizational team (Vince Láng, Ádám Csorba, Endre Dobos) for hosting the First International Soil Training and Contest. The event was very successful in celebrating 2015 as International Year of the Soil.*

*About seventy students and young professionals from 28 countries attended the five-day event, and formed into 16 teams for the soils contest. The training consisted of two half days of lecture on soil properties and classification, with two-half days and two full days of training field trips, where the attendees were given soil pits and guidance for describing, interpreting, and classifying the soil. Erika spent a valiant effort in encouraging participation from less developed countries. This was the first International event since the inaugural International Soils Contest held last year at Jeju, Korea. There was a large increase in the number of participating students and countries, largely because of the sponsors and contest organizers. Erika and her organizing group helped participants with travel, visa, and transportation problems. One coach and team had to travel through a war zone to exit their country, yet they still made the effort and attended.*

*Feedback from surveys by the students indicate an increase in learning and understanding after the course, placing a value on the event, with many participants eager to host their own contests in the future. This was truly an exemplary way to celebrate the International Year of the Soil, by bring such a diverse and widely distributed group of future leaders in soil science together. I would like to express my sincere appreciation to the sponsors and organizers of this event".*

## Pedometrics 2015, Cordoba, Spain, 14-18 September 2015

#pedometrics15, Celebrating International Year of Soils

*By Jason Ackerson, Texas A&M University, USA.*

The 2015 Pedometrics meeting in Córdoba Spain has come and gone. To call the meeting a great success would be an understatement. Tom Vanwallegham and his colleagues at the University of Córdoba arranged a stellar meeting. They compiled a program that not only helped to facilitate a week of fantastic pedometrics discussion but provided meeting attendees a taste of the Spanish and Andalucían way of life.

The scientific program started in earnest Monday morning with a preconference workshop on soil landscape modeling led by Peter Finke and the IUSS working group on soil-landscape modeling. In the morning session, researchers presented their latest work in this exciting arena and in the afternoon walked attendees through first-hand demonstrations of their models. As a complete novice to the soil-landscape modeling realm, I must say I was quite impressed by the sophistication and depth of the current efforts in the field.

The workshop on Monday proved to be the perfect start for the conference. By providing a glimpse of what the future of pedology and pedometrics may hold, the presenters and organizers left me wondering about what is to come for our science. What are current and future limits of pedometrics as a tools set? What can pedometricians contribute to other scientific disciplines? What will pedometrics look like in 10 years' time? In addition to many fascinating pedometrics presentations, several speakers gave more introspective talks; addressing these questions directly.

Group photo Pedometrics 2015

Several speakers asked us to think about the role of pedometrics in the larger scientific community. Jed Kaplan asked pedometricians to provide the kind of data needed for land-surface modelers. Cristine Morgan asked us to think about what questions pedometrics could answer for those studying soil security. Philippe Baveye asked us think critically about the utility of our work and keep the larger scientific questions in mind when approaching our research. Such thought provoking presentations provided an ideal backdrop for three days and nights of pedometrics discussions.

A major highlight of the conference was the conference dinner on Wednesday night. After a remarkable meal and some lively conversation, Budiman Minasny took center stage as he presented the 2014 Richard Webster medal to Gerard Heuvelink. Gerard's acceptance speech was not the only entertainment for the evening as we were all treated to a breathtaking performance of the tango, a truly mesmerizing performance.

Pedometrics 2015 was one of the most rewarding conferences I have ever attended. The small number of participants lent the conference an intimate feeling. Pedometrics is a great community full of passionate and skilled scientists. I am glad to call myself a pedometrician and I look forward to see you all at Pedometrics 2017 in Wageningen.

A second account of the meeting was provided by a participant, Boniface H J Massawe,
Sokoine University of Agriculture, Morogoro, Tanzania:

Pedometrics2015 in Cordoba Spain was my first Soil-focused International Conference. Many thanks to the Pedometrics 2015 Organizing Committee and the International Union for Soil Science (IUSS) for offering me the student scholarship which covered registration costs.

This first soil centered international conference I attended came with a lot of experiences. As I expected, I was able to meet renowned scientists whose publications I have been reading. Their presentations and contributions in the conference reflected what I thought about them being dedicated and very knowledgeable in this lovely field of science. To be honest, I thought almost all of the big names were somewhat aged people, but I was wrong. I was inspired by many of these scientists, old and young, men and women.

Like many other participants, I learned a lot from the presentations on all the themes of the conference. This was possible because there were no parallel sessions, and therefore participants were not compelled to forego some sessions just because they could not be in more than one at a time. I was captivated by presentations that employed proximal soil sensing and geostatistics to study and map soil and soil properties. It is clear that there are prospects of making soil mapping easier and improving reliability of the results. The WG IUSS Soil Landscape Hands-on Modelling Workshop and the Soil & Landscape Modelling were among my favourite sessions. I am curious about how these models will perform in Tanzanian and African soils and landscapes. I am considering using some graduate students to work on some of these models on Tanzanian landscapes. I was happy to note that some of these can be obtained for free. Some presenters offered to assist with additional materials and clarifications when I approached them.

I enjoyed the two tours organized. The guided city walk was very interesting and informative. The structures and explanations showed the beauty and history of the City of Cordoba and its great people. The field trip to Santa Clotilde made me get a better understanding of the Mediterranean landscapes and farming systems. Actually, it was my first time to see an olive tree – and, I realize I was not the only one!

Finally, I should congratulate the Pedometrics2015 Organizing Committee for such a successful and well organized conference. Will be nice to meet again in Wageningen in 2017!

## Sri Lanka - Department of Soil Science Celebrates the International Year of Soils 2015

Celebrating the International Year of Soils 2015, the Department of Soil Science organized a half day program on 28 October 2015 for the school children and the teachers of the Central and Sabaragamuwa provinces. During this event, a book on 'Soil: Properties, Plant nutrition and Sustainable Management', a video on 'Laboratory techniques on soil analysis' and a set of soil samples representing major soil groups in Sri Lanka were distributed among schools. In parallel, a mini exhibition was also conducted to make the students aware of the nature and importance of soils. Nearly, 250 teachers and students participated in this event. The Vice Chancellor of the University of Peradeniya graced the occasion as the chief guest and a special talk on 'Soils and their Importance' was delivered by Dr. R. B. Mapa, Emeritus Professor of University of Peradeniya. This event was funded by the University of Peradeniya.

The book 'Soil: Properties, Plant nutrition and Sustainable Management' for A/L students was published and launched on 'World Soil Day' 2014 with the participation of the teachers and school children of the Western Province and Secretary of the Ministry of the Environment and Renewable Energy as the chief guest at the Public Library, Colombo. The publication of the book was made possible with the financial support from the Ministry of the Environment and Renewable Energy.

## Celebration of the International Year of Soils 2015 and the World Soil Day in Korea

*By Jae Yang, IUSS Past-President*

The ceremonies for the International Year of Soils (IYS) 2015 and World Soil Day (WSD) were held at the K-Hotel during November 25-27 in Seoul, Korea, hosted by Korea Ministry of Environment, Korea Environmental Industry and Technology Institute (KEITI), Soil Environment Center (SEC) and Research Center of Surface Soil Resources Inventory and Integration (SSORii). The events consisted of the opening ceremony, the International symposium and fora on various topics of soils.

During the opening ceremony, the performances celebrating the IYS 2015 consisted of the songs by Rainbow Children Choir, representing the center for multi-cultural Korea), the logo of IYS 2015 by the sand-artist and calligraphy, followed by opening speech by Kim, Yong-Joo (President of KEITI). There were also several speeches on soils of the different views from various stakeholders.


*Sandpainting of IUSS Logo (©Sigbert Huber)*


*Sand painting artist at work (©Sigbert Huber)*


*David Smith, USDA ARS (©Sigbert Huber)*

*Jae Yang, John Cook Oh, Yong-Joo Kim, Sijin Lee and Calligrapher (from the left), (©Sigbert Huber)*

Key speakers invited were Jae Yang (Past-president of IUSS), Lim, Hyoung-Joon (Korea Representative of UN World Food Programme), Lee Rock (11 years old environmentalist and artist boy: *www.earthkid.net*), Sigbert Huber (IUSS Secretary) and David Smith (USDA ARS). They emphasized the importance of healthy soils for a healthy life from different perspectives. Sigbert Huber delivered a speech on the role of IUSS in designating the IYS 2015 and WSD and in promoting soil awareness through the various activities as IUSS the umbrella organization of 60,000 soil scientists.

The international symposia on surface soil with theme of 'Surface Soil, the Key for Human and Ecosystem' and 'Soil Policy' were held to promote the importance of surface soil for the ecosystem services and enhance soil awareness. Nine speak-


*Rainbow Children Choir (©Sigbert Huber)*


*Lee Rock (11 years old environmentalist and artist boy: www.earthkid.net) (©Sigbert Huber)*

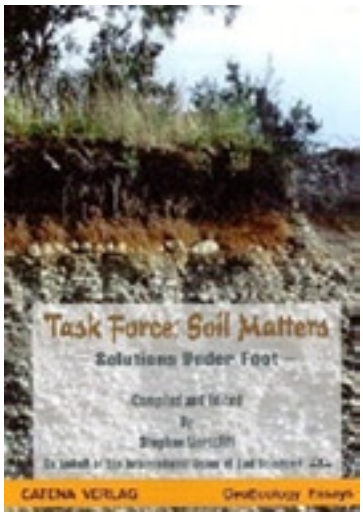
ers were invited to present the research outcomes on soil erosion, conservation, soil quality, policy and security. Sigbert Huber (IUSS Secretary) and David Smith (USDA ARS) were plenary speakers, who presented about soil sealing and soil policy in the USA, respectively. Through the presentations and discussion, participants reached the conclusion that the importance of soil awareness for human health and ecosystem services becomes increasingly important in the future so soil scientists from around the globe should cooperate to share information and experiences. In parallel with the symposia, three more seminars took place on the soil and groundwater industry forum, risk assessment for the management and conservation of soil, and management of groundwater quality. Those activities were broadcast by 13 news media and newspapers in Korea.

# Other IYS activities

## IUSS Publication
## Task Force: Soil Matters – Solutions under foot

Edited by Stephen Nortcliff on behalf of the International Union of Soil Sciences, Nov. 2015, Catena Verlag, GeoEcology Essays. 160 pages, numerous figures, photos, tables. ISBN 978-3-923381-63-0. Price Paperback 14,90 EUR. Contact for order: *catenaverl@aol.com*. This collection of papers seeks to illustrate the diversity of the soils and soil functions and shows the importance of soils for all aspects of our lives. The eight sections of the book deal with soil threats, soil carbon, biodiversity, land use and the environment as well as society. Soil value and ecosystem services as well as the international year of soils are specific topics of this book.

*… In conclusion, it is imperative that we recognise the often pivotal role played by soils in the function of terrestrial environmental systems, if we fail to recognise this key role environmental sustainability may be impossible to achieve.*
*… At a global level in 2013 FAO established the Global Soil Partnership recognising the key role of soils in global food security and recognising that the threat to soils was a major factor to be considered in global food security.*
*… This collection of papers seeks to illustrate the diversity of soils and soil functions and show the importance of soils to all aspects of our lives. There is increasing recognition that we must manage and nurture the soil, because in the lifetime of man soil is a finite resources, and once lost it is gone! (from: Stephen Nortcliff, Soil Matters, p. 3)*

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7.5 Alexandra Regan Toland and Jay Stratton Noller: Soil Matters to Artists: An Overview of Artistic Activities in the International Year of Soils

7.6 Cristine Carole Muggler: Soil and Education

Section 8: The International Year of Soils

8.1 Stephen Nortcliff, Winfried E.H. Blum and Irb Kheoruenromne: World Soil Day and the International Year of Soils

## FAO Soil stories blog

It doesn't matter if you're a farmer, landholder, soil scientist, policymaker or gardener... Tell your soil story by contributing to the blog! One of the primary aims of this international year is to raise awareness about the multiple roles that soils play in all of our lives. By carrying out multiple functions, healthy soils ensure a productive food system, improved rural livelihoods and a healthy environment. You too can raise awareness and safeguard our planet's soils by posting on the official IYS (International Year of Soils) blog. As FAO Director-General José Graziano da Silva said at the launch of the IYS on 5 December 2014, "The multiple roles of soils often go unnoticed. Soils don't have a voice, and few people speak out for them but they are our silent ally in food production." Speak out for soils!

This call for submissions has drawn a number of interesting submissions and the blog has been a success with a wide range of stories from an ecosystem ecologist's search for soil microorganisms in the Arctic, to a project on waste/soils carried out by a teacher and his students in Spain and an Austrian microbiologist's experiment and time-lapse video on building humus. Submissions focused on the multiple roles that soils play in the lives of people from diverse regions of the world; the wide variety of ecosystem services that soils provide; the challenges we face including soil degradation, deforestation, desertification, drought and other environmental issues and successful soil conservation practices to give just a few examples.

Read more:

*http://www.fao.org/soils-2015/news/news-detail/en/c/287757/?utm_source=facebook&utm_medium=social+media&utm_campaign=fao+facebook*

## Watercolors Collection of Soil Profiles of Prof. Kubiëna

On the website of the Institute of Agricultural Sciences (ICA) there is a presentation which contains photographs of some of the original watercolors of soil profiles of Prof. Kubiena, as well as the full collection of their smaller reproductions. This collection has an extraordinary historical value and demonstrates the efforts made by this scientist to establish the pillars of soil micromorphology during his stay at the former Institute of Soil Science and Plant Biology, currently Institute of Agricultural Sciences. These small plates were used as illustrations in the book of Prof. Kubiëna, "The Soils of Europe", published simultaneously in German ("Bestimmungsbuch und Systematik der Böden Europas"), and Spanish ("Claves Sistemáticas de Suelos"), a work considered during many years a master piece for the study and teaching of Pedology. Following the success of these publications, a new book was prepared, "Atlas of Soil Profiles" (also published in Spanish, "Atlas de Perfiles de Suelos"), in order the readers could keep loose the coloured plates of soil profiles. The original watercolors from this collection were painted by Gertrud Kallab and Anton Prazak. This work also contributes to the celebrations of (CSIC) and the Spanish Soil Science Society (SECS) to commemorate "2015 International Year of Soils" (UN Resolution A/RES/68/232). Website: *http://www.ica.csic.es/Kubiena2/index-en.html*. Corresponding article "Art in Science: Kubiena's Soil Profiles in Watercolors" posted by John Freeland June 14, 2015:

*http://blogs.agu.org/terracentral/2015/06/14/art-in-science-kubienas-soil-profiles-in-watercolors/*

## Innsbruck Nature Film Festival: Movie category soils - a non-renewable livelihood!

Soil is the foundation of our lives and of all ecosystem services, although it is so far little present in public consciousness. But it is a very important part of our nature: it enables food production, serves as an important water storage and water filter, converts and dissipates organic residues and makes pollutants harmless. Remarkably there are more organisms living in soils than on its surface! Today we take soil for granted, resulting in numerous negative consequences such as soil loss and soil destruction. 350-400 km² of arable soils are lost every day worldwide. Now it is necessary to protect soils sustainably as a resource and there-

fore for our existence. For that reason the United Nations proclaimed 2015 as the International Year of Soils. The World Soil Day (5th of December) also offers an annually opportunity to point the way for the importance of soil as a resource and to campaign for soil protection. This year the Innsbruck Nature Film Festival called to send in films about soils. For the first time there was a separate category for films concerning soils which also has its own film award.

**1ha 43a, by Monica Pirch** (Germany) was nominated best soil-related film and awarded a special price of € 2000.- Read more: *http://www.inff.eu/?events=1ha-43a* and *http://www.inff.eu/wp-content/uploads/2015/09/PREISE-INFF-2015.pdf*

## New movie about the fascinating world of soils

The world beneath our feet is amazing! NRCS' Amy Overstreet talks about the discoveries she's made throughout her exploration during the International Year of Soils *https://www.youtube.com/watch?v=h7Ywgav7fDI&index=10&list=PL4J8PxoprpGZ3gPDXRfa_DNBYXoF-ruG2*

## Global Soil Biodiversity Initiative (GSBI) Blog

The International Year of Soils 2015 is nearly over and all around the world scientists, producers, and educators have used using this recognition to bring awareness to the urgent need of sustainable soil anagement. Especially during IYS the GSBI asked for researchers' help in fulfilling the responsibility to communicate the importance of soil biodiversity to a wider audience. GSBI's Blog "Beneath Our Feet" has served as a place for researchers to post about research, inform the community on global soil legislation, and release announcements from their professional organizations.

# Soil Treasure Unearthed

*Article submitted by Susan Y. Demas, MLRA Soil Scientist NRCS and Eileen Miller, Resource Conservationist, NJ NRCS*[6]

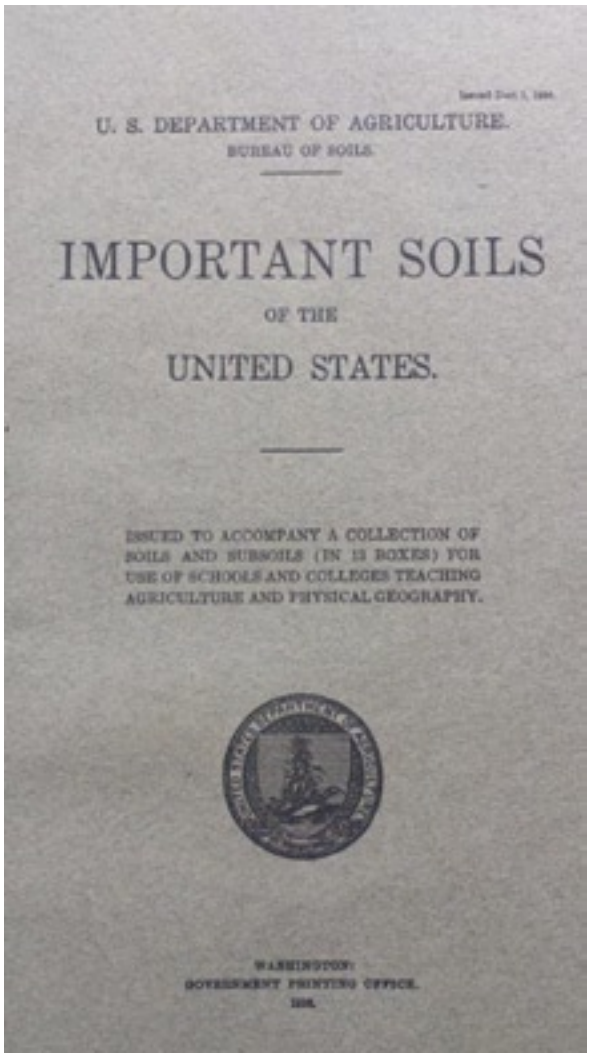
*Editor's comment: This article is written in first person by Susan Demas, but she wishes to credit Eileen as co-author for contribution of pictures and other information.*

Recently, Eileen Miller a colleague of mine with NJ Natural Resources Conservation Service (NRCS) sent me an email concerning an unusual collection which had been given to her by a local science teacher. Eileen is a resource conservationist, with NJ NRCS specializing in soil health. Eileen's name had been given to the local science teacher by Angela Andreoli, Cumberland County NJ Farm Service Agency as a possible contact for finding a permanent and suitable resting place for the unusual collection. Along with Eileen's email came pictures taken by her of this unique and very special collection, which just so happens to be soil collected one hundred years ago.

The 1916 soil collection has had an interesting history. The teacher responsible for conveying this treasure to Eileen is Jill Guenther, a science teacher with the Cumberland County NJ School District. Jill, a teacher for the past 28 years, was given the collection by another teacher who came across it in one of her classroom cabinets. According to Ms. Guenther "I've been teaching Earth and Space Science for the past 28 years at Vineland High School. I've had a love of the Earth's features and soils for as long as I can remember…probably starting with my mother's family, who originally were Vineland, NJ farmers, emigrated from Italy. About 10 years ago, a colleague noted my fascination, and remembered finding a soils collection in a classroom cabinet." Ms. Guenther has been using the collection ever since to teach students about weathering and erosion. Ms. Guenther also noted that the bulletin accompanying the collection made mention that the kits were made for schools. Worried that the soil samples could be lost or broken she decided that the collection should have a suitable home and reached out to Eileen, who shares her love of soils.

[6] An earlier version of this article, prior to its donation to NAL appeared in Pedologue, the Newsletter of the Mid-Atlantic Association of Professional Soil Scientists, Summer or Spring/Summer (it is listed in both ways) 2015 issue. Link to the MAPSS website and Pedologue *http://www.midatlanticsoilscientists.org/pedologue/*


*Photograph of the 1916 U.S. soil collection and publication, "Important Soils of the United States", United States Department of Agriculture, Bureau of Soils, December 1, 1916. Soils of each Region of the U.S. are represented.*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IMPORTANT SOILS
OF THE
UNITED STATES.

ISSUED TO ACCOMPANY A COLLECTION OF SOILS AND SUBSOILS (IN 13 BOXES) FOR USE OF SCHOOLS AND COLLEGES TEACHING AGRICULTURE AND PHYSICAL GEOGRAPHY.

Close-up Photograph of the bulletin "Important Soils of the United States, U.S. Bureau of Soils, 1916" that was issued to accompany a collection of soils and subsoils (in 13 boxes) for use of schools and colleges teaching agriculture and physical geography.

Immediately upon receiving Eileen's email about the collection, I contacted Dr. Del Fanning because I thought that anyone knew of the collection it had to be Del, and for assistance in trying to find a permanent home for the collection. Del had numerous ideas such as possibly housing the collection at the World Soil Museum in the Netherlands, the Smithsonian Institution, the National Agriculture Library (NAL), the University of Maryland Archives, or even possibly the "Dig It" Exhibit, all of which were given as suggestions to Eileen. Del contacted many others including Dr. Edward Landa, Adjunct Professor, Environmental Science and Technology Department, University of Maryland and Dr. Dennis Merkel, Professor in the School of Biological Sciences at Lake Superior State University concerning the U.S. Bureau of Soils' collection to find out whatever he could. Dr. Merkel happened to have a copy of the bulletin. He remarked that there were no authors listed, but that it was his opinion that the publication no doubt was abstracted from "Soils of the United States". (Edition, 1913.), United States Department of Agriculture, U.S. Bureau of Soils, Bulletin 96, 1913 by Curtis F. Marbut, Hugh H. Bennett, Jessie Erwin (J.E.) Lapham, and M. H. Lapham. According to Dr. Landa "I think the term "physical geography" in the subtitle of the bulletin is reflective of Curtis Marbut's influence. He had long standing, strong ties to the physical geography community from his days at University of Missouri and extending to his career at the Bureau of Soils."

Macy Lapham having come from Michigan State University, was born in Okemus, Ingham County, Michigan on 10 Apr 1874. He began his career in 1898 as a soil mapper in the Western U.S. in California and Arizona. His earliest mapping involved the use of a horse and buggy. He eventually rose in the ranks to become Inspector of the Western Division, Bureau of Soils. As Inspector he spent time traveling around the Country with the then, party leaders, correlating soils. His brother J.E. spent a good part of his career conducting soil surveys in the Mid-West in places like Texas, Kansas, Arkansas, Indiana and even North Carolina.

In the meantime, I was able to contact Dr. Douglas Helms, retired historian, USDA NRCS. Although Dr. Helms at the time was unfamiliar with the collection, he noted that the U.S. Bureau of Soils did exhibit such collections at world fairs. Dr. Helms thought that the NAL would be the best fit for the collection and also provided a contact for the "Special Collections" section with the NAL. After evaluating all options, it appeared that the best fit for the collection would be the NAL.

On August 19, 2015, fifty people including staff from the University of Maryland, Rutgers University, NRCS, ARS, National Agriculture Library (NAL), and members of the Mid-Atlantic Association of Professional Soil Scientists (MAPSS) gathered at the NAL for a ceremony to convey the historic 1916 U.S. soils collection to NAL. The donor, Jill Guenther donated a valuable collection of U.S. soils to the Library where the collection will be archived for safekeeping, included in Library exhibits, and available upon request for onsite inspection.

After a welcome from Acting NAL Director Stan


*Photograph of a close up of the collection by U.S. Regions. Each soil series present in the collection consists of a glass vial sample of top soil and a vial of subsoil.*

Kosecki and opening remarks from ARS National Program Leader Sally M Schneider, NRCS Assistant Chief Kirk Hanlin and Deputy Chief for SSRA David Smith shared their insights into the importance of soil education in the past, present and future and their enthusiasm for this donation. Jill Guenther also spoke and was then presented with a certificate commemorating her donation.

Following the dedication and signing of the deed to the NAL, the group was treated light refreshments

*Map of the United States by Region showing 13 regions taken from "Soils of the United States". (Edition, 1913.), United States Department of Agriculture, U.S. Bureau of Soils, Bulletin 96, 1913. Photo courtesy of Dr. Dennis Merkel.*

*NAL Supervisory Librarian Susan Fugate, ARS National Program Leader Sally Schneider, Acting NAL Director Stan Kosecki, Vineland teacher Jill Guenther, NRCS Assistant Chief Kirk Hanlin, NRCS SSRA Deputy Chief David Smith*

and a unique tour of the NAL special collections, highlighting important soil and plant related material. The NAL is planning an on-line exhibit of the collection and we are hopeful for a physical exhibit in 2016, the year of its centennial.

The collection represents a crucial link to the past by representing soil science knowledge and theory at the time the collection was made and demonstrates how soil information was conveyed during early efforts of the national U.S soil survey that was started in the USDA Bureau of Soils in 1899. The map with 13 soil regions was the second U.S. national soil map, Brevik and Hartemink (2013)

**Reference:**

Brevik, Eric C. and Alfred E. Hartemink. 2013. Soil maps of the United States of America. Soil Sci. Soc. Am. 77: 1117-1132.

This 1916 collection ending up in the special collections of NAL for the centennial of its beginning is a fitting end to a “soil treasure”, indeed, may it help spur our current continuing soil science education efforts.

# Reflections of a Veteran Soil Scientist

*By Nicolae Florea (nicolae.florea21@gmail.com), Titular Member of the Academy of Agricultural and Forestry Sciences, "Gheorghe Ionescu-Şişeşti", Bucharest, Romania*

After a long life of intense but captivating activity (69 years) in the soil science field, especially in soil survey, now when I've written a book entitled "Soil – our partner of existence" (2013), I meditated upon some concepts and ideas on soil – based on my personal experience acquired especially by investigations in landscapes – in order to bring them nearer to reality. Some aspects were already included in my last published papers, other aspects are still topics for meditation, for reflection. These are ideas that crossed or heaped up in my mind. Often, they have changed in the course of time; but this is to be expected because new knowledge accumulation results in new ideas and more suitable concepts.

In the following pages I give free rein to an inward impulse of bringing in discussion some questions, in order to better understand the soil, this very complex natural living system, which deserves our respect, if not admiration. Indeed, the soil – such a complex system, with multiple implications in nature, life and society – deserves more attention and meditation, both on the soil itself (as individual, as throng) and on its relationship with the environment, life and mankind.

## 1. The soil, as a result of the continuously synergic interaction of fluxes, processes and environmental factors at earth's surface

The actual concept of soil, introduced by V.V. Dokuchaev (1883) and formalized by H. Jenny (1941), is the one of natural body or system at earth's crust surface formed as a result of pedogenetic processes developed under the concomitant influences of the environmental factors, concept symbolized by the known triad:

*Factors* → *processes* → *soil (properties)*

This concept, very fruitful, results in the development of soil science (Pedology in a larger meaning) because it has permitted the knowledge and understanding of the soil organization and its place in nature, the relations with environmental factors and its indispensable functions for nature, life and society.

The participation of energy and substances to soil formation and dynamics was mentioned by Dokuchaev himself and developed by V.I. Vernadski, V.R. Volobuev, V.A. Kovda and others which have shown the importance of biochemical cycles and exchanges of energy and substances, to which Stasiev (2006) added information. Nevertheless, the energy aspects and the ones of substances and energy fluxes are not adequately reflected in the pedogenesis concept.

Only lately (Florea, 2013; Florea et al., 2014) these aspects were approached and the mentioned known triad was developed into the triangle scenario of the *synergic interaction of fluxes of substances, energy, information with pedogenetic processes and environmental factors* in the formation and dynamics of the soil. This scenario is sketched in figure 1, in which the relation of the

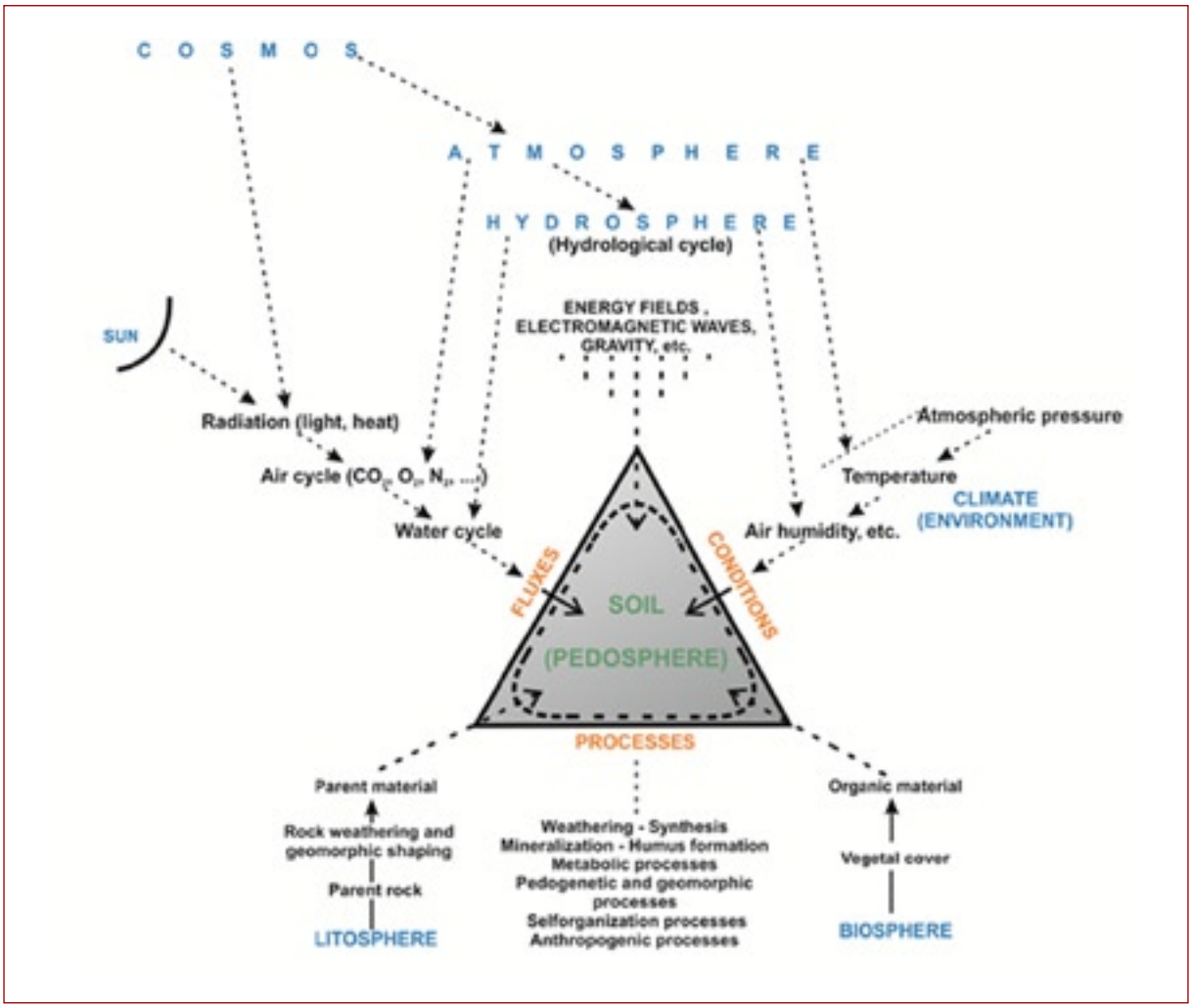


*Figure 1. Triangle of synergic interactions of fluxes-processes-factors in pedogenesis having within inscribed the soil (pedosphere), with a cyclic dynamics.*

pedosphere with the other geospheres is also presented.

It must be mentioned that the fluxes of substances, energy and information vary cyclicly and permanently, irrespective of the stage of soil development or of the anthropogenic soil modification degree, not only in soil but also on environment (often remaining unseen or hardly perceptible at human life scale).

In addition, the whole dynamics of soil and soil cover is under the influence of some waves and force fields (electric, electromagnetic, radiative, gravitational) often undiscernible. It seems that the metabolism itself, involved in nutrition and other processes with energy release ("activated energy" originated from biogenic organic compounds), produces electromagnetic waves (fields), very important for vital processes.

In this synergic scenario five categories of actions are involved. In the first place three great categories of transformation and substances cycles (geological, biological, pedomorphogenetic) can be distinguished, to which the forth category, relief shaping, can be associated; the unidirectional flux of solar energy can be discerned as the fifth category.

The new scenario brings the soil genesis nearer to the idea of matter movement, of continuous change and evolution under a permanent "flow" of energy and substances (For more information see Journal of the Romanian Society of Soil Science "Știința Solului", vol. XLVII, no. 1/2013). Also, it corresponds to a more adequately ecosystemic approach, recently discussed by Robinson et al. (2012).

In my opinion the energy aspects and also the development of the new branch of biogeoenergetics proposed by Kovda as far back in 1973, deserve more attention.

## 2. Is the soil a monoparental body? Does it have only mother rock?

In the actual soil conception, the rock which generated the soil is considered parent rock (roche mére, Muttergestein, mother-rock or maternal rock, materinskaia paroda, rocă-mamă). The parent rock (mother rock) is the one which gave rise to the parent mineral material which – by "biologisation" – became the soil mineral substratum; this soil mineral substratum received its main properties from the parent rock (material) as heritage (dowry) (Gîţă, 1997).

But this parent material becomes soil only after the vegetation fixation and the parent material was impregnated with organic matter and living organisms; in this way the parent material was "biologised" so that it also received some characteristics from the vegetation (vegetal cover).

In consequence, the soil "inherits" features both from the mother-rock and from the vegetation formation (cover); the soil therefore is not a monoparent body (system) (Florea et al., 2013).

The texture (particle size distribution), the mineralogy and base content of any soil depend in a great extent on the kind of mother-rock (parent rock), while the kind and characteristics of the soil organic substances (various as composition, degree of humification and N-content, base saturation) and soil biocoenosis (biopedoplasm included) depend on the type of plant associations which continuously provide the soil with photosynthetised organic matter.

In conclusion, the *mother-rock (parent-rock)* which delivers the soil mineral substratum and *plant association* which provides the organic matter out of which the humic substances and soil biopedoplasma are formed, can be regarded as *"soil precursors", one of them mineral and the other organic*. They are distinct participants to the soil formation ("*maternal site*" and "*paternal site*"). Indeed, as in any couple, the organic matter continuously entering the soil is the one (biological part) that recurrently fecundates the mineral substratum, making the soil fertile.

## 3. The cyclicity of soil dynamics

The cyclic development of many soil processes and the role of the reversible and irreversible processes in soil formation and evolution were underlined by Rode (1955), Gerasimov (1960) and then by Arnold et al. (1990), and the pedorhythm notion and the role of the annual pedorhytms in the soil dynamics and soil evolution mechanism were discussed by Florea (1994; 1996; 2010; 2013). Recently the concept of pedofluctuation for ondulatory variation of soil cover was defined by Munteanu (2002).

As a matter of fact the cyclicity is now regarded as a basic characteristic of all the phenomena of the Universe. Also, the living organisms have a biological rhythm (biorhythm).

The soils, by their nature, are characterized by features influenced both through cosmic and telluric cyclicity and biologic cyclicity. Two kind of cyclicity can be distinguished for the soil evolution, a current or short term cyclic dynamics defined as pedorhythmicity (or rhythmic soil dynamics) and a long term ondulatory cyclic soil dynamics and evolution defined as pedoperiodicity (soil evolution at geological scale) (Florea, 2010; 2013).

The pedorhythmicity of the soil formation and evolution refers to the cyclic dynamics of the pedogenetic processes. Very important is the yearly pedorhythm that refers to the annual dynamics, continuous but with seasonal oscillations; its annual changes, $\Delta S$, though imperceptible, by accumulation over a long time result in soil individualization or evolution.

The annual pedorhythms can be continual, uniform or non-uniform, in warm zones or discontinuous in the temperate and cold zones, being relatively interrupted, or slackened due to freezing (cryoruptic pedorhythm), drying (aridoruptic pedorhythm) or both (aridocryoruptic pedorhythm). These kinds of pedorhythms can be correlated with American soil temperature and moisture regimes.

The pedoperiodicity refers to the soil and the soil cover changes at geological scale, named pedofluctuations (Munteanu, 2002) or may be, better, pedogeofluctuations. They can be continuous (ondulatory, pulsatory) or discontinuous (intermittent). The great successive climatic changes (glaciations, interglaciations) in Quaternary are associated with ondulatory pedogeofluctuations reflected by the sequence of loesses and fossil soils.

The discontinuous pedogeofluctuations are determinated by the soil cover distruction at one time, suddenly, due to an intensive (catastrophic) action of some geological phenomena. The duration of the distruction of soil cover may be short, but remaking (regeneration) of soil cover needs a long time.

## 4. Biopedoplasm, soil specific component

The soil components – mineral (under solid, liquid and gas phases), organic and living organisms – form together the pedological elementary matter (named meped) specific for the soil mass, which

represents "the bricks and the mortar" of all aggregates of the organizing successive levels of the soil mass (micropeds, macropeds, horizons, profiles).

The essential component of this pedological elementary matter (meped) is the biopedoplasm, a substance specific only for the soil (Florea, 1989). The biopedoplasm is an intimate combination of the mineral and organic colloids (clay and humus) that represents together the soil pedoplasm which is intermingled with soil microorganisms, forming soil biopedoplasm or pedostructural matter. It is similar to the biostructural matter from biology (Macovschi, 1969), which has vital functions in living organisms (especially for the metabolism).

The biopedoplasm is in fact the most essential element of the soil which clearly differentiates it from other nature bodies and lends it altogether specific features. The soil makes the transition between the lifeless mineral world and the organic living world according to Murgoci (1924), idea that has to be more profoundly understood, in the meaning of transferring to the soil (through biopedoplasm) some features of a living creature, as in any live system (Florea, 1989).

The presence of the biopedoplasm only in soil, not in other bodies, is an incontestable argument for the consideration of the soil as a distinct object (body) that strengthens the idea that soil science is an independent science, having a proper object of study, even if soil science is a transition science between earth-sciences and life-sciences.

## 5. The syntagm "pedogenetic factors" has to be better understood

This syntagm, well known in soil genesis, whose significance results from the known triad "*factors → processes → soil (properties)*" played and still plays a main and efficient role in Pedology (Rode, 1955; Kovda, 1973; Stasiev, 2006).

But, as Jenny underlined (1941), the natural factors from the soil study moment are "state factors" that can be pedogenetic factors or not. In cases of polygenetic soils it is very difficult to correctly establish the pedogenetic factors because the soil developed in time passing through many periods of evolution whose natural factors were different from the actual factors; and these previous factors are not known, they can be deduced or presumed.

The pedogenetic factors are soil forming factors in the strict sense of the term, only for the period of soil development from parent material to the mature state of the soil profile or climax state. In this climax period, a steady state period, the environmental factors (remaining the same) become factors which keep soil stability or factors of homeostasis. If a modification of the environmental conditions takes place, the soil will develop adapting to the new conditions so that they become evolution factors of soil until a new climax stage (steady state) is reached; from this moment the environmental conditions (factors) become soil stability maintenance factors (factors of homeostasis) for the new climax stage (new steady state) (Florea, 2013). And the sequence can go on, it can resume.

Therefore, it is useful to differentiate the various roles of the pedogenetic factors as state (momentary) factors, forming factors, homeostasis keeping factors, evolution (adapting) factors, homeostasis keeping factors at a new level of development, etc.

Regarding to time and space, these ones are not pedogenetic (forming) factors; they form the background of the soil existence. The soil space is, as a matter of fact, well specified by the soil definition itself as the upper layer at earth' surface crust, whose thickness is tiny, of tens of thousands times smaller than the thickness of the atmosphere or lithosphere. In this hypostasis, soil (pedosphere) surface superposes on relief surface, the soil and relief surface forming an indissoluble unit; the relief-configuration is at the same time the soil cover configuration.

From a global perspective, the soil is localized at the surface of the land, while the time is the irreversible dimension of the succession of changes (events) and evolution of the soil.

## 6. The soil, cosmico-tellurico-biotic formation

By its nature, the soil is a very complex natural formation: cosmic, telluric and biotic (Florea et al., 2014).

Soil is a cosmic formation, especially through the energy that is continuously received from the Sun, and also by the cosmic radiations that arise on Terra, as well as by the cosmic phenomenon cyclicity transmitted to the terrestrial (Earth) phenomena.

Soil is a telluric formation both through the origin of the various substances involved in soil processes and through the continuous action of the gravitational force of the Earth. Especially the lithosphere is involved through geochemical and geomorphic cycles that take place at the Earth's surface crust, also the hydrosphere through the water cycle in

nature, as well as the atmosphere through the gases exchange with the soil.

Soil is a biotic formation (and not a simple organo-mineral formation) because the soil contains not only mineral and organic substances (inert) and makes the link between lifeless and living matter, but it includes – as component part, integrated to the soil – living organisms of various species and of various sizes that are indispensable for the soil existence and its functioning. The biosphere is, therefore, active both by vegetation activity – as vegetal cover at the soil's surface with its root system – and by metabolic processes within the soil generated by the proper soil biocoenosis.

This astral association and interference with life proves the huge complexity of the soil-system, meaning that it is not merely a terrestrial body, but also a sidereal formation with transcendental reverberations.

## 7. Is the soil a thing or a process?

In the philosophical sense of the true nature of soil, a question can be raised (Munteanu, 2011), namely if the soil is a thing or a process. Indeed, the soil is characterized by the development of very many and various processes and by a specific dynamics, in lack of which it can not exist: due to this dynamics, some soil properties (the labile ones) can oscillate between some limits, especially the properties connected to temperature, moisture, air and nutrients regimes.

Other properties – considered more stable – are being very slowly modified, often imperceptible for periods exceeding human life duration; these properties give soil the stability character specific to things.

Therefore the soil is both thing by its stable features which are used for its identification, but also process due to its continuous cyclic functionality and labile features which imply the permanent changes of some soil specific properties, closely linked with energy and substance fluxes.

Thus, the soil is similar to a living organism which presents a distinct body, in which permanent vital processes and changes take place through energy consuming.

## 8. Is the soil a distinct terrestrial ecosystem?

In the current acceptance, the terrestrial ecosystem is considered as having been formed by terrestrial biocoenosis and its biotope, consisting of climate (climatope) and soil (edaphotope).

But at an attentive (thorough) examination, the soil itself seems to be a separate ecosystem, having a proper biocoenosis (the edaphon), fact remarked by numerous soil scientists and biologists (Chiriţă, 1955, 1974; Borza and Boşcaiu, 1965; Butucelea, 1977; Brady and Weil, 2008; Lovelock, 1993; Ursu, 2011 and others).

According to this thinking, the terrestrial ecosystem has a binary character (Florea, 2013), being made out of two (terrestrial) ecosystems: the ectoterrestrial ecosystem, from the land surface, and the intraterrestrial ecosystem that corresponds to the soil itself. The soil is at the same time edaphotope for the ectoterrestrial ecosystem and (non-living part) for the intraterrestrial ecosystem.

The two ecosystems (ectoterrestrial or aboveground and intraterrestrial or belowground) form an indissoluble co-operating association, a tandem that corresponds to the whole terrestrial ecosystem (Wardle et al., 2004).

The differentiated long term evolution of the two mentioned ecosystems must also be underlined. At a geological scale, the modification of the ectoterrestrial ecosystem takes place without keeping anterior features; on the other side, in the case of the intraterrestrial ecosystem, the soil, this modification (evolution) leaves marks in the soil under the form of relict features (the soil becoming polygenetic). Therefore these characteristics justify the differentiation of the two ecosystems which form together the binary terrestrial ecosystem.

## 9. What is the soil and how can it be defined?

The soil is a natural formation so intricate and with so many implications in nature, life and society, that it is very difficult to give a succinct but comprehensive definition.

The soil may be regarded from various hypostases:

- geological or geologico-geographic formation, produce of the earth' surface crust weathering;
- geoderm, at the land surface, protecting the lithosphere;
- natural body at the surface of the earth's crust, independent and self-organized;
- component of the terrestrial ecosystems;
- living body (system) or formation with behaviours of a living body;
- complex material (mineral-organic mixture) having the capability to be fertile;
- resource for various utilizations;
- source of information and documentation, keeper of vestiges;
- milieu for plant growth, used as production

means in agriculture and silviculture, support of the biosphere;
- regulatory system of some terrestrial processes on the earth, on which life quality depends;
- space (area) for human settlements, infrastructures, industrial activities, trade or transport activities, recreation and entertainment, etc., support for human activities;
- ground (foundation) or geotechnical support for various buildings, installations, etc.;
- material for construction, resource for various applications;
- purifying system, filter, sanitary agent, etc.;
- storehouse and provider for nutrients, water, air, etc.;
- reactor or factory at global scale, economical polyvalent resource conditionally regenerative;
- cosmic, telluric and biotic formation specific for Terra.

Although the soil corresponds to and is a part of all these (and may be even others) hypostases (figure 2), it cannot be fully identified with any of them; hence the difficulty of succinctly defining the soil arises. The most simple, but acceptable soil definition is "The soil is the self-organized three-phase layer (system) of mineral and organic compounds and living organisms from the surface of the land, in which complex synergic interactions take place among fluxes of substances, energy and information with bio-geo-chemical and organizational processes, under the influence of environmental factors, various in space (at land surface) and variable in time". By its properties, the soil represents the growth milieu of vegetation that forms the basis of biosphere's existence (man included) and also the landscape nucleus with ecologico-planetary functions.

Very suggestive for the link soil - biosphere it seems to be the idea (the image) of the plant root system as umbilical cord of the biosphere (with its creatures that are uninterruptedly born) that binds it with its "mother", the Earth (and its geosphere) through the soil, sketched in on world emblem of IUSS for the World Soil Day. To better understand the soil definition, some supplementary explanations on soil properties and soil functions (often named "soil services") are necessary. Soil fertility is, as a rule, considered the most important property connected to food security assurance, although the other properties (functions) are equally important.

## 10. An existential (ontological) point of view on soil

Lately, some discussions on the soil notion (Ibanez and Boixadera, 2002; Nachtergaele, 2005; Johnson and Johnson, 2010; Munteanu, 2010; Florea, 2010; Targulian, 2011) took place. A topic that arose in these discussions was the philosophical consideration (Munteanu, 2010, quoting Vrlkley, 2007) the "existence of the concrete individual (this) is prioritaire face its attributes (what) "…". This interpretation justifies integration along with soils of earthy entities without specific pedological architecture (horizon, colour, a.o.)".

Indeed, the essence of a soil system is its continuous fluxes of cosmic (solar) energy and uninterrupted cycles of substances (water and air included) within the mineral substratum, more or less "biologised", from the earth' surface crust, and their interactions with bio-geo-chemical soil processes; these interactions, influenced by environmental agents, result in – after a long time – soil organization (soil profile). Therefore, the rock with its patina (or patinated rock), rock with cracks or fissures, desert pavement and sediment outcrops (more or less impregnated with organism) are also soils (at time zero or near zero), because these ones function through interactions of above mentioned fluxes and processes, as soil in embrionary phase (and in time the mature stage will be developed with corresponding profile).

Indeed, by analogy, the sprouted plant seed belongs to the respective plant, although it does not have the plant physiognomy. But in time, the plant germ will develop, going over different stages with corresponding appearance, till it reaches the maturity stage (the physiognomy of this stage is considered as reference for the plant characterization and diagnose, without neglecting the previous stages). If for the plants, this development from seed (germ) to mature stage lasts a relatively short time and different stages can be seen, in the case of soils much more time is necessary (centuries or even thousands of years) so that the soil development stages can not be seen during a human life.

Therefore, the different stages of soil development, having apparent stability over a long time, were considered (judged) as distinct soil entities and classified as such (a conventional approach).

Consequently, from this point of view, the specific soil self-organization, very important for soil classification, is not an indispensable condition for soil existence; the interactions between fluxes of energy, substance and information with soil

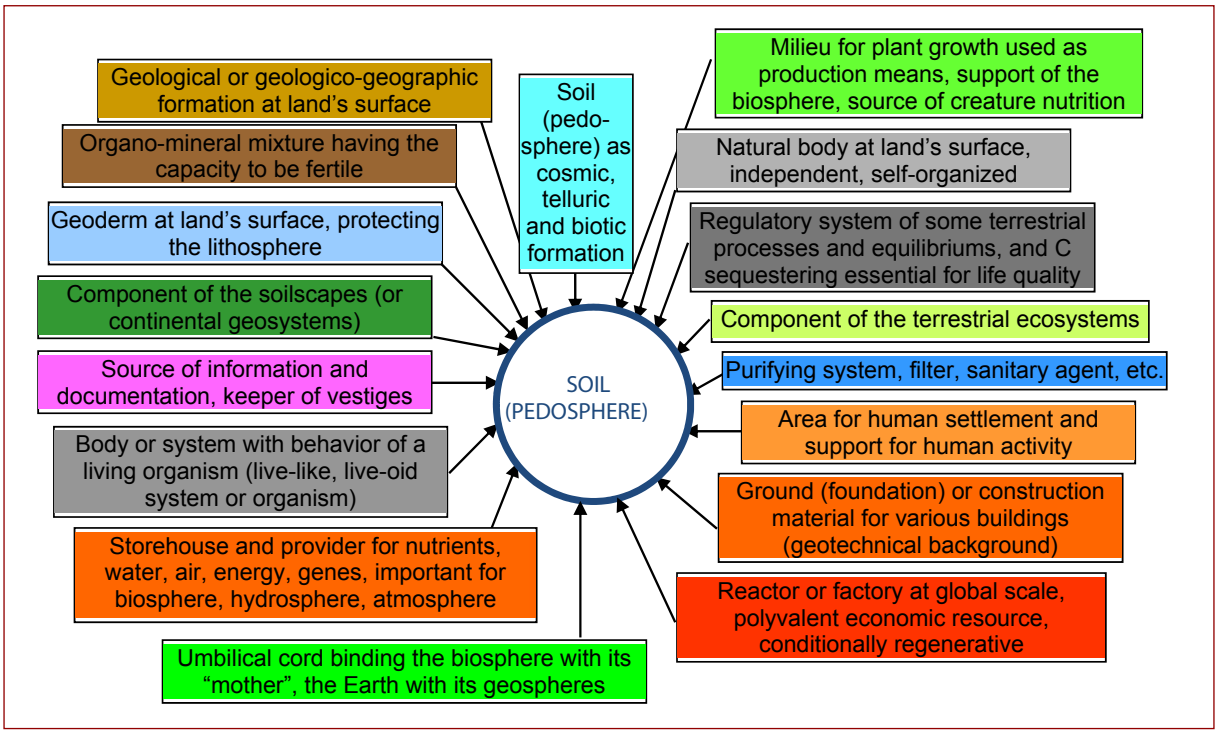


*Figure 2. The "kaleidoscope" of soil significations*

processes, always acting at land surface, are essential for soil existence; even in eroded soil or in anthropogenic deposits, these interactions go on irrespective of soil erosion degree or morphological aspect (modified of course, according to new conditions). They can be likened to the plant DNA (deoxyribonucleic acid). Any area of the terrestrial cover can be, therefore, included in the soil map as a component of the soil cover with its specific features.

## 11. The pedogeographic assemblage (fabric) of the soil cover

A soil map renders the spatial soils distribution as natural entities and resources, specifying the soil types (nature) and varieties, and the geographic repartition of these soils or their simple associations (combinations) in a territory; in this respect it is an inventory, an useful agricultural implement. But a soil map reflects other characteristics of the soil cover as well, deduced from the spatial arrangement of soil or soil combination units, from the relations among soil units and between these ones and the environment, considering the soil cover of a geomorphic unit as a systemic whole.

This second aspect began to be more intensive studied after the introduction of the genetico-geographic concept of soil cover structure by Fridland (1972), enlarging the idea of soil associations (combinations), initially only cartographic (Simonson, 1971; Boulaine, 1975; 1980), and developing a new domain of soil geography. Dijkerman (1974) discussed the question of soilscapes as level of soil spatial organization and Buol et al. (1980) consider the soilscape as "true assemblage of polypedons". Lieberoth (1982), Nemecek and Tomasek (1983), Belobrev and Vaskez (1986), Girard (1984), Schlichting (1986), etc. bring contributions to the characterization of the soil cover structure. Florea (1986; 1989; 2001; 2010) formulates the notion of soil cover assemblage (fabric) or pedogeographic assemblage (fabric).

The pedogeographic assemblage (fabric) is defined as spatial arrangement of the soil cover components regarded as systemic constitutive elements, therefore from the point of view of kind, proportion, distribution pattern, pedogenetic and geographic relations, functionality, irrespective of the size, development stage or hierarchical level of the respective components (system).

This notion of pedogeographic fabric (assemblage) is based on the concept of the soil cover structure (Fridland, 1972) being a completion of this, because it represents the existence form of the soil cover in various conditions. Indeed, a unit of pedogeographic assemblage is a concrete expression of soil cover structure that can be classified and characterized by some specific features and

quantitative indicators. The relationship between the concept of soil cover structure and soil cover assemblage (fabric) is similar to the connexion between time and duration (with its units of measure), or between notions of evolution and stage of evolution (with its features and indices). The notion of soil cover structure is a highly generalizing genetic geographic concept, while the notion of pedogeographic assemblage (fabric) is more or less a concrete expression form of soil cover structure having specific characteristics and the possibility to be quantitatively described.

Although in Russia, a pedogeographic school of study of the soil cover structure was developed, the new notions are not enough investigated, both for specific characterization and systematization. Following feature have been suggested (Fridland, 1972; 1974; Florea, 1989; 2000; 2010) as criteria for characterization: conformation of soil cover (land relief), soil components and proportion, distribution pattern and complexity, pedological contrast and heterogeneity.

Until now, one cannot speak on a specific well elaborated terminology and systematization. In general, the soil cover assemblages (fabric) are described taking into account some features referring to: physiognomy of soil cover (land forms); kind of dominant and associated components; contrast and links among components; pattern (model) of the components distribution or assemblage configuration, etc., in many cases using quantitative parameters.

The knowledge of the soil structure, respectively the soil cover assemblage (fabric) of different geomorphic units, is very useful for a more adequate management of the soil resources. Also these concepts assure a more solid foundation for the activities of zoning and regioning of the soil cover.

The *soil entities* (polypedons) are specific elementary forms of soil selforganization and existence making up the Pedosphere. The *soilscapes* are specific forms of association, cohabitation and functioning of the soil entities within various territorial units, marking the pedodiversity of the soil communities (soilscapes) in Pedosphere. The *pedogeographic assemblages* (fabric) mark the various ways of the soil entities juxtaposition in different soilscapes specifying the peculiarities of various soilscapes (pedocomunities) of the Pedosphere and their differentiating features.

## 12. Do soils exist on the surface of celestial bodies without life?

The soil, as it is known on Terra, is the result of the interaction between the biosphere and lithosphere (with addition of solar energy) under the existing conditions on the earth' surface crust. The soil assumes life existence; from produce of life, the soil became the main support of life.

But in the current language the terms of Moon soil and Martian soil are common terms after the man disembarkation on the Moon, although both Moon and Mars do not have life.

The idea of defining an "Universal Soil" on the various celestial bodies was first proposed by Johnson et all. (1997), and taken again by Johnson and Johnson (2010), Targulian (2011) and Munteanu (2011). A definition is proposed by Munteanu (2011) – if this idea is accepted – for the concept of "Universal Soil", namely: "the uppermost layer (rhegolith) of various thickness, of land masses of Earthlike celestial bodies, resulted through physical and chemical weathering, associated or not with biological processes, which plays the role of interface for matter and energy exchange with the cosmic environment". More simple is the definition proposed by Johnson and Johnson (2010): "Soil is substrate at or near the surface of earth and similar bodies altered by biological, chemical, and/or physical agents and processes". But in this definition, the soil main point is blured.

Targulian (2011) also proposed the extension of the concept of soil for the upper part of the weathering crust of any heavenly body under action of the exogenetic processes and factors and to denominate it "exterrasol" or, maybe, more correctly in my opinion, "exterrapresol", in order to underline non-participation of the biologic factor to soil genesis, situation that existed on Terra before life emergence.

But, is it indeed appropriate to define unknown objects or objects with uncertain existence?

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# IUSS Alerts June - November 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 June and November 2015.

### 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 June and November 2015.

### Digital Soil Morphometrics

The IUSS Working Group on Digital Soil Morphometrics held its inaugural global workshop 1-4 June 2015 in Madison, USA. The workshop focused on in situ soil property assessment, soil depth functions, mapping and imaging of the soil profile and use and application of digital soil morphometrics. The workshop was attended by 70 soil scientists from over 15 countries. The Second Global Workshop on Digital Soil Morphometrics will be held 20-23 June 2017 at The James Hutton Institute in Aberdeen, Scotland UK. For more information see *www.digitalsoilmorphometrics.org*

### Soil Atlas of Latin America and the Caribbean

(English and and Portuguese version available)

On 10-11 June 2015, the EU held a high level summit with the Community of Latin American and Caribbean States (CELAC) under the title "Shaping our common future: working for prosperous, cohesive and sustainable societies for our citizens". On this occasion, the English and Portuguese versions of the JRC Soil Atlas of Latin America and the Caribbean were launched. This publication was offered by the Commission President to the 61 heads of delegation, including more than 40 heads of state or government from CELAC and EU Member States taking part in the summit. The Soil Atlas of Latin American and the Caribbean is an initiative funded by the EUROCLIMA programme, which aims to promote cooperation between Latin America and the European Union (EU) in the field of climate change. The aim of the atlas is to support sustainable soil management, and to help promote an understanding of the state of and importance of soil in order to encourage its preservation. Produced by the JRC, this Atlas sets out to improve communication and raise the awareness of the general public, politicians and scientists about the importance of the soil in Latin America. An English version is available (Portuguese in draft) from: *http://eusoils.jrc.ec.europa.eu/library/maps/LatinAmerica_Atlas/*

### Cover Management (C-factor) for soil erosion modelling

The C-factor (USLE/RUSLE erosion modelling) accounts for how land cover, crops and crop management cause soil loss to vary from those losses occurring in bare fallow areas. The C-factor is perhaps the most important factor with regard to policy and land use decisions, as it represents conditions that can be most easily managed to reduce erosion. The Cover Management high res-olution dataset (100 m) is based on the hybrid C-factor Land Use and Management (LANDUM) model. The LANDUM model for C-factor estimation is differentiated between a) arable lands and b) all other land uses (non-arable). In arable lands, the C-factor is estimated using crop statistics (% of arable land per crop type) and data on management practices such as reduced tillage (no till), plant residues and winter cover crops. The C-factor in non-arable lands is modelled by weighting the range of val-

ues found in literature according to fractional vegetation cover, which was estimated based on the COPERNICUS Remote Sensing dataset Fcover. Data for C-factor and management practices are available from: *http://eusoils.jrc.ec.europa.eu/library/themes/erosion/CoverManagement/*

## Landform classification (Data available)

The landform classification following Meybeck et al. (2001) presents relief classes, which are cal-culated based on the relief roughness. Roughness and elevation are classified based on a DEM according to static thresholds, with a given window size. The landform classification following Iwahashi and Pike (2007) present relief classes which are classified using an unsupervised nested-means algorithm and a three part geometric signature. Slope gradient, surface texture and local convexity are calculated based on the SRTM30 DEM, within a given window size. Data are available for download: *http://eusoils.jrc.ec.europa.eu/projects/landform/*

Dairy Grazing Management Can Restore Soils, Reduce Carbon Footprint [bold]

Well-maintained pastures prevent erosion, protect water and, as it turns out, can restore the soil's organic matter much more quickly than previously thought, according to a team of researchers from the University of Georgia and the University of Florida. Source: *http://www.cornucopia.org/2015/05/dairy-grazing-management-can-restore-soils-reduce-carbon-footprint/*

## An animated introduction to soils functions and threats – © FAO *https://www.youtube.com/watch?v=CZNanlXMXk4#t=14*, by the Food and Agriculture Organization of the United Nations (FAO)

## Soils and Biodiversity

Soils host a quarter of our planet's biodiversity. Soil is one of nature's most complex ecosystems: it contains a myriad of organisms which interact and contribute to the global cycles that make all life possible. Related links: *http://www.fao.org/soils-2015/en/*; a pdf can be downloaded from *http://www.fao.org/resources/infographics/infographics-details/en/c/285727/*

## Rainer Horn, IUSS President, selected to be a member of the Intergovernmental Technical Panel of Soils (ITPS)

The Global Soil Partnership (GSP) had invited all its partners to nominate soil experts from their regions as candidates for appointment to the Intergovernmental Technical Panel of Soils. The IUSS Secretariat is happy to announce that IUSS President Prof. Dr. Rainer Horn was accepted as German expert to represent Europe on the Intergovernmental Technical Panel of Soils for two years.

## A tale of 2 (soil) cities

Recent work showed that long-term differences in soil use and management influence not only the sizes and numbers of soil aggregates, but also what the pores inside them will look like. Soil is a living, dynamic substance, and the microbial life within it is crucial to providing plant life with the food they need to grow. The microbes can be bacteria or fungi, but both need space—the pores—for a good living environment. Soil particles that clump together are aggregates. These are the architectural building blocks of soil. Their presence has a major effect on the behavior of the soil as a community. Read more at *https://www.soils.org/discover-soils/story/tale-two-soil-cities*

## Global soil week minutes

This year, the Global Soil Week highlighted how sustainable soil management and responsible land governance is key to the post-2015 development agenda and the on-going negotiations of the Sustainable Development Goals (SDGs). The first day of the Global Soil Week 2015 was dedicated to the link between soils and land and the goals and targets of the new sustainable development agenda. On the second day participants started addressing questions of implementation, monitoring and accountability of the post-2015 development agenda and the SDGs. While the SDGs were developed largely in isolation from each other, the third day explored an integrated approach to the SDGs. Read more at: *http://globalsoilweek.org/wp-content/uploads/2015/05/IISD_GSW15_sum.pdf*

## Peak fragility: conserving mountain soils an urgent matter

Mountain soils are the fragile foundations of ecosystems that ultimately provide water for more than half the world's population. A new FAO book offers technical insights on the sustainable management of mountain soils, which are home to a vast array of human activities ranging from quinoa cultivation in the Andes through European ski resorts to the collection of medicinal plants in Tajikistan's "roof of the world" Pamir range. Read more at *http://www.fao.org/news/story/en/item/294317/icode/*

## Soils host a quarter of our planet's biodiversity

Soil is one of nature's most complex ecosystems: it contains a myriad of organisms which interact and contribute to the global cycles that make all life possible. Read more at: *http://www.fao.org/resources/infographics/infographics-details/en/c/285727/*

## Soil Functions

Soils deliver ecosystem services that enable life on Earth. Read more at: *http://www.fao.org/resources/infographics/infographics-details/en/c/284478/*

## Soil related films

**Soils: Our ally against climate change**

A look at how our Soils help combat climate change in their role of sequestering CO2, and how our collective habits can damage this benefit with potentially devastating consequences. Soon available in Arabic, Chinese, French, Russian and Spanish. See more at: *http://www.fao.org/globalsoilpartnership/information-resources/videos-and-animations/soils-our-ally-against-climate-change/en/*

**The Living Kingdoms Beneath Our Feet**

Soil is a living, dynamic resource at the surface of the earth. It is a complex habitat of mineral and organic particles; living organisms including plant roots, microbes, and larger animals; and pores filled with air or water. In a thimble full of soil—about a gram in weight—you can expect to find 100 million to 1 billion bacteria! This video explores the living kingdoms beneath our feet and helps illustrate the fact that soils support more life beneath their surface than what exists above the surface What is a living soil? It's where the plant and the soil are one. See more at: *https://www.youtube.com/watch?v=HQMlAX6yTd8&index=8&list=PL4J8PxoprpGZ3gPDXRfa_DNBYXoF-ruG2*

**Just What the Doctor Ordered**. Face it: We have been brought up to believe that all bugs are bad bugs. But the fact is, most bugs, or shall we say microbes--which includes bacteria and fungi-- are actually good. And what's more, microbes produce compounds which they use to defend themselves against their fellow microbes. These are naturally produced antibiotics. *https://www.youtube.com/watch?v=1zHxBHMJAG8&list=PL4J8PxoprpGZ3gPDXRfa_DNBYXoF-ruG2&index=9*

**The Science of Soil Health: Nature's Way of Extracting Minerals from Soil**. Through respiration, soil microbes provide key benefit to plants. *https://www.youtube.com/watch?v=7id24FKSqWs*

**Soils Protect the Natural Environment: Which soil is under your feet?** Well, that depends on where you are. But, no matter where you live, soils protect the natural environment around you. No matter where you live, there is soil under you. And, it is a resource we need to protect, because soils sustain life. *https://www.youtube.com/watch?v=hpMG43oFin4&feature=youtu.be*

**Soils help moderate global temperatures, store carbon, and can preserve records of past climates**. Soil is a precious natural resource that has significant interactions with Earth's climate system, but it can't do its job if we keep disturbing it. When soils are allowed to interact with the plants and water systems they were meant to support, soils support life. *https://www.youtube.com/watch?v=T4A_rMlHcyE*

## Soil Quiz

What's Your Soil IQ? Got the dirt on soil? Let's see what you've got. *https://www.playbuzz.com/ifdcvs10/whats-your-soil-iq*

## Below Our Feet, a World of Hidden Life

The soil teems with billions of hidden microbes. Researchers have begun to catalogue how these organisms are changing the world. Read more at: *https://www.quantamagazine.org/20150616-soil-microbes-bacteria-climate-change/*

## FAO soil and land legacy maps

FAO Land and Water Division (NRL) has made an effort to make Soil Legacy data and information available for their users. In that regard, FAO has finished uploading 1228 soil and land legacy maps (mainly soil maps and also land use, geological and land cover legacy maps). More at: *http://www.fao.org/soils-portal/soil-survey/soil-maps-and-databases/fao-soil-legacy-maps/en/*

## Answer to earthworm's ability to digest poisons unearthed by scientists

All plants contain toxins which continue to work after leaf fall, so how worms are able to stomach dead grass and leaf litter has long been a mystery. British scientists have cracked the global earthworm mystery: they have worked out how the planet's great subterranean reprocessing system copes with the poisons that would choke most herbivores. More here: *http://www.theguardian.com/science/2015/aug/04/earthworms-ability-digest-poisons-unearthed-molecules-drilodefensins*

## Brazilian website on soil

Easy Pedology (*www.pedologiafacil.com.br*) by Helium Prado, researcher of Instituto Agronomico de Campinas in Brazil, deals with different topics of soil classification and management. It is available in English and Portuguese. The site main objective is a simpler way to socialize soil knowledge for students and professionals in agricultural sciences, biological, geological and geomorphological.

## Rise of the citizen scientist

An article in Nature reflects a paper in Geoderma entitled 'Can citizen science assist digital soil mapping?' (D. G. Rossiter et al. Geoderma 259–260, 71–80; 2015) which makes the case that, non-specialists can help expert soil scientists to track quality, properties and types of soil. It goes further: these amateur soil researchers should be recruited to help with existing and future national surveys. Civil engineers and construction workers routinely view the subsoil, and digging foundations for buildings and trenches for pipelines offers a unique look at the spatial variability of different layers. An army of geocachers — twenty-first-century treasure hunters — visit harsh terrain and difficult-to-access places, and could collect soil data. And they routinely use satellite navigation to record their journeys. See full article here: *http://www.nature.com/news/rise-of-the-citizen-scientist-1.18192?WT.mc_id=FBK_NATURE_1508_FHEDITORIALCITIZENSCI_PORTFOLIO*

## Kenyan loan rates linked to soil quality

Agricultural produce remains Kenya's largest export and in many parts of the country, the loss of fertile top soil is a major problem. Population growth, erosion and poor methods constantly threaten the viability of the soil and its ability to grow crops. But now, a Kenyan company is offering loans to farmers where the interest rates charged are linked to the quality of the soil, providing an incentive for soil preservation. The BBC's Hannah McNeish reports from the Aberdares in central Kenya for Africa Business Report. Source: *http://www.bbc.com/news/business-33732443*

## Let's Talk About Soil!

Most people are unaware of the wonderland that is hidden below our feet. And yet, without soils we would not live. We could not feed ourselves, produce our clothes or the fuel and medicinal products we need. Soils recycle waste materials back into nutrients, store and filter water, and are home to a breath-taking amount of organisms. All of this happens 'hidden' from our eyes. That's why it is high time to put soils in the spotlight! In collaboration with Heerenstraat Theater Wageningen and Lazuur food community, ISRIC-World Soil Information organised a film & discussion event Let's Talk About Soil! Friday, 25 September 2015. For more details, see our webpage: *http://isric.org/content/let's-talk-about-soil*.

## The Value of Land - 2015 ELD Report

Land degradation is an increasing issue globally, exacerbated by climate change and affecting food security, threatening water resources and ultimately acting as a driver to migration. The ELD study, undertaken over the past 4 years, quantifies the costs of land degradation and sets out a universal approach for quantifying the economic benefits of sustainable land management. It aims to enable decision makers to better understand the overall costs and benefits when implementing policies and actions dealing with land. The Economics of Land Degradation (ELD) Initiative is a platform for discussion between stakehold-

ers from the policy, science, and private sectors that focuses on developing globally-relevant data on the economic benefits of land and land-based ecosystems. Aiming at these target groups, the initiative has compiled specific reports: one primary main report and a parallel report geared towards policy and decision-makers. These were launched and presented in Brussels in September 15, 2015. Download the new reports 'The Value of Land' & 'ELD report for policy & decison makers':
*http://www.eld-initiative.org/index.php?id=121*

## Land and Soil Management Award 2015/16

The prize rewards land use and soil management practices mitigating soil threats i.e. soil degradation, erosion, reduction of organic matter content, diffuse contamination, and compaction as well as the reduction of soil biodiversity, salinization, sealing, flooding and landslides. In doing so, the award sheds light on outstanding achievements, encouraging new concepts of land and soil protection and their implementation in land management, as well as enhancing awareness about the importance of land and soil functions. *http://www.europeanlandowners.org/awards/soil-land-award*

## IUGS émile Argand Award

A prize to be called the STENO Award was created and agreed by the International Union of Geological Sciences (IUGS) Executive Committee (EC) and Council during the 34th International Geological Congress (IGC) in Brisbane, 2012, to be awarded for the first time during the 35th IGC Opening Ceremony in Cape Town in 2016. Due to the fact that the Danish Geological Society traditionally distributes a STENO prize, it is necessary to rename the IUGS award as the IUGS émile Argand Award. The IUGS émile Argand award is intended to honour an active senior geoscientist of high international recognition and an outstanding scientific record. The deadline for nominations was 15 December 2015.

## Declining Use of Soil Classification

In the past 40 years, much time has been spent in a relatively small part of the soil science community on developing soil classification systems. Although there has been criticism on the products, it has yielded enormous insight on what soils are, and how they could be grouped taxonomically or for environmental or agricultural purposes. An analysis how soil classification and factor and soil property naming have been used in journal papers between 1975 and 2014 found that there is an exponential increase in the use of Taxonomy and WRB, but factor and property naming in soil science papers increases much faster than Taxonomy and WRB. More on this analysis *http://www.sciencedirect.com/science/article/pii/S2352009415000231*

## Intensifying agriculture threatens soil diversification

New research suggests that soil biodiversity is on the decline. 2015 is the International Year of Soils and the U.N. General Assembly hopes to increase awareness of soil's important role. More: *http://www.csmonitor.com/Business/TheBite/2015/0903/Intensifying-agriculture-threatens-soil-diversification*
Source: Christian Science Monitor, 04 September 2015

## Has farming become a soil-forming factor?

From erosion to acidification to loss of organic matter, the impacts of agriculture on topsoil are well known. But an open access paper in the July-August 2015 issue of the Soil Science Society of America Journal now suggests that farming's effects on soil actually go much deeper. In a study that examined how soils across Iowa have evolved during 50 years of agricultural use, Iowa State University scientists Jessica Veenstra and Lee Burras uncovered the usual changes in surface soils that come with plowing and fertilizing, including acidification and damaged soil structure. Full article: *https://dl.sciencesocieties.org/story/2015/aug/thu/has-farming-become-a-soil-forming-factor*

## FAO Soil Quiz

Do you know what a healthy soil is, or how long it takes for one centimetre of soil to form? Test your knowledge about soils! 15 questions to test your soil knowledge:
*http://www.fao.org/soils-2015/news/news-detail/en/c/317128/?utm_source=facebook&utm_medium=social+media&utm_campaign=fao+facebook*

## The dirt on soil: Underground biodiversity holds key to ecosystems

Biodiversity below ground is almost as important to an ecosystem as the life above ground, a new study finds. The often overlooked underground world of worms, insects and bacteria plays a greater role in supporting ecosystems than previously realized, according to a study released Wednesday. Earlier research had established that ecosystems can carry out more functions more efficiently when there is greater above-ground biodiversity, but a study released Wednesday in Nature Communications, indicates that below-ground biodiversity is nearly as important to a properly functioning ecosystem. Read more: *http://macroecology.ku.dk/media/news_list/2015/09_biodiversity-belowground-is-just-as-important-as-aboveground/*

## Topsoil physical properties at European scale (using LUCAS topsoil)

The LUCAS topsoil database was used to map soil properties over the geographical extent of Europe. Several soil properties were predicted using hybrid approaches like regression kriging (topsoil texture and related derived physical properties). Regression models were fitted using, among other variables, remotely sensed data coming from the MODIS sensor. The high temporal resolution of MODIS allowed detecting changes in the vegetative response due to soil properties, which can then be used to map the distribution of soil features. Cross validation of the fitted models proved that the LUCAS dataset constitutes a good sample for mapping purposes. Predicted properties: Clay content(%), Silt content(%), Sand content(%), Coarse fragments(%), Bulk density, USDA soil texture, Available Water Capacity. More at: *http://esdac.jrc.ec.europa.eu/content/topsoil-physical-properties-european-scale-using-lucas-topsoil*

## Soil erosion by water (RUSLE2015) in Europe

At a resolution of 100m, this is the most detailed assessment yet of soil erosion by water for the EU. The study applied a modified version of the Revised Universal Soil Loss Equation (RUSLE) model, RUSLE 2015, which delivers improved estimates based on higher resolution (100 m compared to 1 km) peer-reviewed inputs of rainfall, soil, topography, land use and management for the year 2010 (the last year for which most of the input factors were esti-mated). The model can be used to predict the effect of a range of policy scenarios. It is also replicable, comparable and can be extended to model other regions. All the input layers (Rainfall Erosivity, Soil Erodibility, Cover-Management, Topography and Support Practices) have been peer reviewed and published as well. The soil erosion dataset for the European Union (EU-28) at 100m resolution is available: *http://esdac.jrc.ec.europa.eu/content/soil-erosion-water-rusle2015*

## European Soil Data Centre (ESDAC)

The European Soil Data Centre (ESDAC) is the thematic centre for soil related data in Europe. It is the single reference point for relevant soil data and information at European level. It contains a number of resources that are organized and presented in various ways: datasets, services/applications, maps, documents, events, projects and external links. After more than 10-years of service, the European Soil Portal is replaced with the ESDAC. A new portal was developed incorporating all data and information from the European Soil Portal. The new portal is more dynamic, with better look and feel and with emphasis on data. *http://esdac.jrc.ec.europa.eu/*

## European Food Safety Agency (EFSA) new data

New data has become available in relation to "Scenario Selection and Scenario Parameterisation for Permanent Crops and Row Crops on Ridges in Support of Predicting Environmental Concentrations of Plant Protection Products and Their Transformation Products in Soil" (OC/EFSA/ PRAS/2013/01). A database was compiled of the spatial distribution of permanent crops in the EU. A total of 2013 combinations of crop, soil and climate ('plots') were parameterised in GeoPEARL model. *http://esdac.jrc.ec.europa.eu/content/european-food-safety-authority-efsa-data-persam-software-tool*

## New Zealand Soil Treasures

Dr Allan Hewitt recently unearthed (from storage boxes retrieved from a condemned building at Lincoln University) a field trowel belonging to Norman Taylor. In Allan's words "It is a beauty and labelled as Taylor's trowel used in the Northland soil survey". It is a great piece of New Zealand soil science history and we are keen to find out more about it and preserve and recognise its significance. If

you know anything of its history we would like to hear from you. Also, as part of IYS celebrations the Council are keen for your ideas on how we may recognise its importance to New Zealand soil science, maybe part of a new or existing award, or in any other way. So, please contact us with your ideas.

Source: New Zealand Soil News - Newsletter of the New Zealand Society of Soil Science; ISSN 0545-7904 (Print), ISSN 1178-8968(Online), Volume 63, Number 3, August 2015

## Do soils and geology always protect groundwater from pathogens?

Countless ways exist for water-borne bacteria to die or get stuck in soil and geologic sediments. This is why scientists tend to assume that a thick layer of these materials will keep pathogens in surface-applied manures from seeping down into groundwater. University of Guelph geologist Emmanuelle Arnaud and her colleagues thought so, too—until they conducted the work that appears in the September-October issue of the Journal of Environmental Quality. To their surprise, they detected E. coli bacteria in groundwater one week after an application of liquid swine manure on a farm field, even though 12 meters of soil and glacial sediments lay in between. Read more *https://dl.sciencesocieties.org/story/2015/sep/tue/do-soils-and-geology-always-protect-groundwater-from-pathogens*

Source: ASA (American Society of Agronomy) – CSSA (Crop Science Society of America) – SSSA (Soil Science Society of America) Science Policy Report, September 2015

## The hunt for antibiotics in soil

Slava Epstein feels a reverence for soil. In January, the Northeastern University microbiologist and his colleagues at NovoBiotics unveiled teixobactin—one of the most promising antibiotics of the last decade. But for Epstein, the key is how they found it, in a soil sample from a Maine field. If he's right, teixobactin may mark a new era in antibiotic discovery. Epstein's work ranges from identifying the microbes that live on human teeth to deciphering the microbial ecology of a lake in Greenland. He's also deeply intrigued by the mystery of why so few microbes can be grown in the lab. Read more *https://dl.sciencesocieties.org/publications/sh/articles/56/5/sh2015-56-5-f*

Source: ASA (American Society of Agronomy) – CSSA (Crop Science Society of America) – SSSA (Soil Science Society of America) Science Policy Report, September 2015

## Soil microbe plays a role in Nobel Prize in physiology in medicine

Diseases caused by parasites have plagued humankind for millennia and constitute a major global health problem. In particular, parasitic diseases affect the world's poorest populations and represent a huge barrier to improving human health and well-being. This year's Nobel Laureates have developed therapies that have revolutionized the treatment of some of the most devastating parasitic diseases. One of the recipients is Satoshi Ōmura, a Japanese microbiologist and expert in isolating natural products, isolated new strains of Streptomyces from soil samples and successfully cultured them in the laboratory. One of these cultures later turned out to be *Streptomyces avermitilis*, the source of Avermectin, derivatives of which have radically lowered the incidence of River Blindness and Lymphatic Filariasis, as well as showing efficacy against an expanding number of other parasitic diseases. Read more *http://www.npr.org/sections/thetwo-way/2015/10/05/445976576/work-on-parasite-diseases-earns-nobel-prize-for-medicine*

Source: ASA (American Society of Agronomy) – CSSA (Crop Science Society of America) – SSSA (Soil Science Society of America) Science Policy Report, October 2015.

## Erosion of organic carbon in the Arctic as a geological carbon dioxide sink

By Robert G. Hilton, Valier Galy, Jérôme Gaillardet, Mathieu Dellinger, Charlotte Bryant, Matt O'Regan, Darren R. Gröcke, Helen Coxall, Julien Bouchez & Damien Calmels. Soils of the northern high latitudes store carbon over millennial timescales (thousands of years) and contain approximately double the carbon stock of the atmosphere. Warming and associated permafrost thaw can expose soil organic carbon and result in mineralization and carbon dioxide ($CO_2$) release. However, some of this soil organic carbon may be eroded and transferred to rivers. If it escapes degradation during river transport and is buried in marine sediments, then it can contribute to a longer-term (more than ten thousand years), geological $CO_2$ sink. Samples from the Mackenzie River reveal that the eroded biospheric

POC has resided in the basin for millennia, with a mean radiocarbon age of 5,800 ± 800 years, much older than the POC in large tropical rivers. Read more *http://www.nature.com/nature/journal/v524/n7563/full/nature14653.html#figures*

Source: Nature 524, 6 August 2015

## The International Year of Global Understanding

The International Council for Science (ICSU), the International Social Science Council (ISSC), and the International Council for Philosophy and Human Sciences (CIPSH) announced that 2016 will be the International Year of Global Understanding (IYGU). The aim of IYGU is to promote better understanding of how the local impacts the global in order to foster smart policies to tackle critical global challenges such as climate change, food security and migration. See the IYGU Press Release here *http://www.icsu-geounions.org/files/IYGU_PressRelease.pdf.*

"We want to build bridges between global thinking and local action," said Benno Werlen, Professor of the Friedrich Schiller University Jena, Germany. "Only when we truly understand the effects of our personal choices – for example in eating, drinking and producing – on the planet, can we make appropriate and effective changes," said Werlen, who initiated this project of the International Geographical Union (IGU). IUGG and other ICSU GeoUnions (*http://www.icsu-geounions.org*) enthusiastically supported the IYGU, both scientifically and financially. In 2016, the IYGU program will be coordinated by Regional Action Centers. The IYGU Secretariat in Jena, Germany, coordinates all IYGU activities. More information on IYGU is available at: *http://www.global-understanding.info*.

Source: IUGG Electronic Journal Volume 15 Number 10 (1 October 2015)

## New FAO infographic

Climate change represents a major threat to global food security. The agricultural sectors are particularly exposed to the impacts of climate change and climate variability; therefore soils are essential in the debate on how we tackle climate change. Healthy soils can play an important role in climate change mitigation by storing carbon (carbon sequestration) and decreasing global greenhouse gas emissions in the atmosphere. At the same time, agriculture contributes significantly to climate change through greenhouse gas emissions (GHGs). If soils are managed poorly or cultivated through unsustainable agricultural practices, soil carbon can be released into the atmosphere in the form of carbon dioxide which can contribute to climate change. As crop production has intensified, our soils have suffered the consequences. The steady conversion of grassland and forestland to cropland and grazing land has resulted in historic losses of soil carbon worldwide. In fact, land-use conversions and drainage of organic soils for cultivation are responsible for about 10% of all greenhouse gas emissions.

Read more:
*http://www.fao.org/soils-2015/news/news-detail/en/c/340765/?utm_source=twitter&utm_medium=social+media&utm_campaign=faoknowledge*
or *https://twitter.com/search?q=iys%202015&src=typd*

## Regenerative organic agriculture puts soil health front and center

On Oct. 21, 2002, a New York Times editorial proclaimed: "Today marks a milestone in American farming." The newspaper lauded the long-awaited implementation of the U.S. Department of Agriculture's National Organic Program (NOP), which defined the word organic and established—for the first time—who could and could not use it legally. The real value of the program, the Times argued, was not in any added health benefit of organic food itself (that had yet to be scientifically validated), but rather in its emphasis on soil preservation. "In an organic system … the soil grows richer and richer, more and more fertile. It does not blow or wash away," the editorial explained. "Buying organic food is a way to support the health of the soil itself. For that alone, it deserves our support".

Read more: *http://newhope360.com/food-beverage/regenerative-organic-agriculture-puts-soil-health-front-and-center*

## A unified initiative to harness Earth's microbiomes

Despite their centrality to life on Earth, we know little about how microbes interact with each other, their hosts, or their environment. Although DNA sequencing technologies have enabled a new view of the ubiquity and diversity of microorganisms, this has mainly yielded snapshots that shed limited light on microbial functions or community dynam-

ics. Given that nearly every habitat and organism hosts a diverse constellation of microorganisms—its "microbiome"—such knowledge could transform our understanding of the world and launch innovations in agriculture, energy, health, the environment, and more. We propose an interdisciplinary Unified Microbiome Initiative (UMI) to discover and advance tools to understand and harness the capabilities of Earth's microbial ecosystems. The impacts of oceans and soil microbes on atmospheric CO2 are critical for understanding climate change. By manipulating interactions at the root-soil-microbe interface, we may reduce agricultural pesticide, fertilizer, and water use, enrich marginal land and rehabilitate degraded soils. Microbes can degrade plant cell walls (for biofuels), and synthesize myriad small molecules for new bioproducts, including antibiotics. Restoring normal human microbial ecosystems can save lives [e.g. fecal microbiome transplantation for Clostridium difficile infections]. Rational management of microbial communities in and around us has implications for asthma, diabetes, obesity, infectious diseases, psychiatric illnesses, and other afflictions. The human microbiome is a target and a source for new drugs and an essential tool for precision medicine. Read more: *http://www.sciencemag.org/content/350/6260/507*

### Permafrost: The Tipping Time Bomb

One of the most feared of climate change "feedbacks" is the potential release of greenhouse gases by melting arctic permafrost soils. New research indicates a critical threshold of that feedback effect could be closer than we once thought.
*https://www.youtube.com/watch?v=FLCgybStZ4g&feature=youtu.be*

### Erosion in forestland

This study provides first a pan-European analysis that delineates the spatial patterns of forest cover changes in Europe, and then makes a dynamic assessment of the soil loss potential in the EU-28 forests. A recently published High-resolution Global Forest Cover Loss map (2000–2012) was reprocessed and validated. Results show that the map is a powerful tool to spatiotemporally indicate the forest sectors that are exposed to cover change risks. An accuracy assessment is performed by using a confusion matrix based on 2300 reference forest disturbances distributed across Europe resulting in values of 55.1% producer accuracy. The derived maps provide spatially explicit indicators to assess the human-induced impacts of land cover changes and soil losses on the European soil-related forest ecosystems. The following datasets are available: Soil loss potential (by water erosion), Forest Cover Change (ha) and Forest Fires (ha). Read more: *http://esdac.jrc.ec.europa.eu/content/erosion-forestland*

### Common Agricultural Policy: Tackling soil loss across Europe (in NATURE)

Recent developments on soil erosion modelling at JRC have been published in a NATURE correspondence. The article indicates how the soil erosion continues to outstrip soil formation across the European Union. The European Union Common Agricultural Policy (CAP) is narrowing this gap. The intervention measures through CAP have reduced the rates of soil loss by water erosion in the European Union during the last decade, especially in the arable lands. The article has been published in collaboration with NERC, Centre of Ecology (UK). Read more: *http://www.nature.com/nature/journal/v526/n7572/full/526195d.html*

# Upcoming Conferences and Meetings

## 2016

**12th International Conference of the Egyptian Soil Science Society (ESSS) - Development of Water and Soil Resources: Challenges and Solutions**; Ismailia, Egypt, March 7-9, 2016; 2nd announcement. Conference topics: Soil security and global soil crisis; Global Climate Changes and Natural Resources; Emerging issues in soil and water management; Science and Technology in Environmental Resource Management; Sustainable Agriculture; Global Environmental Changes and Human Health. Abstract deadline February 18, 2016. Please send abstracts to Prof. Elsayed Gaber *gabersalex@yahoo.com*.

**Intersol 2016: Sites & Sols Pollués / Polluted Sites & Soils**, Lille, France, March 15-17, 2016. Call for Papers Deadline: November 4, 2015. The 2016 conference will be under the heading: Polluted sites and soils and health risks; diagnosis and solutions: how far can we go? Further information is available at *www.intersol.fr*

**40th Annual Conference of the Soil Science Society of Nigeria**, University of Calabar, Cross River State, Nigeria, March 14-18, 2016. The urgent need for Nigeria to sustainably increase agricultural productivity and food security for the country's 178.5 million people in the face of climate change, environmental degradation and declining soil fertility is a challenge that the Soil Scientists in the country are committed to solving. Conference theme: "Promoting use of Nigeria's Soil Resources for Sustainable Ecosystem Services, Climate-Smart Agriculture, Food and Nutrition Security". Conference registration fee: $75 USD. For the conference programme please contact *sssninfo@gmail.com*.

**EGU General Assembly 2016 (EGU2016) – Call for Abstracts**

The start of the abstract submission for the EGU General Assembly 2016 (EGU2016), 17–22 Apr 2016, Vienna, Austria was announced. You are cordially invited to browse through the sessions at: *http://meetingorganizer.copernicus.org/EGU2016/sessionprogramme*. Detailed information on how to submit an abstract can be found at: *http://egu2016.eu//abstract_management/how_to_submit_an_abstract.html*

Deadline for the receipt of abstracts is 13 Jan 2016, 13:00 CET. In case you would like to apply for support, please submit no later than 01 Dec 2015. Further information about the EGU General Assembly 2016 can be found at: h*ttp://egu2016.eu/*

**1st International Conference on Advances in Soil Sciences (ICASS 2016)**, Mediterranean Azur Hotel, Cornish Road, Roushdy, Alexandria, Egypt, May 2-5, 2016. The conference is organized to facilitate the exchange of information and views among scientists and stakeholders involved in land resources research, land management and land use policy planning.. Main topics of the conference: soil policy and the future of land; remote sensing applications in soil sciences, digital soil mapping, soil genesis and classification, soil chemistry, soil fertility and plant nutrition, soil hydrology, soil management and reclamation, land degradation and environmental hazards; land conservation, soil biodiversity, advances in soil micromorphology, climate change impacts; soil carbon and organic matter, land and water use management, precision farming and agricultural sustainability and climate change.

**International Conference on Conservation Agriculture and Sustainable Land Use**, Budapest, Hungary, at the Hungarian Academy of Sciences, May 31 – June 2, 2016; organized by the Geographical Institute of the Hungarian Academy of Sciences. Aims of the conference will be to share knowledge of conservation agriculture internationally, also across different scientific fields. For details visit the event's website: *http://caslu2016.mtafki.hu/*

**ESSC 2016 – European Society for Soil Conservation International Conference "Soil – Our Common Future"**, Cluj-Napoca, Romania, June 15-18, 2016. For further information go to: *http://essc2016.conference.ubbcluj.ro*

**International Summer School: Advanced methods and new integrated approaches to study soil processes in mountain ecosystems**

The Italian Soil Science Society (Division 2) and SENSFOR COST Action ES1203 are organizing an International Summer School as a training activity

for PhD students. It will be hosted in the Alpine Study Centre of Pieve Tesino TN (Italy), June 26-30th, 2016 *http://www.centrostudialpino.unitus.it/*.
The general subject of the School is: "Advanced methods and new integrated approaches to study soil processes in mountain ecosystems". The objective is to provide a general overview of soil forming factors in forest ecosystem and to promote exchange and discussion about advances in soil processes knowledge. The Summer school is open to 30 PhD students and young soil scientists. It will consist of invited lectures, scientific session with oral presentation and field excursion.

**19th Nitrogen Workshop**, Skara, Sweden, June 27-29, 2016. Deadline for abstract submission is 20 January 2016. For more information, visit: *http://www.nitrogenworkshop.com*

**7th Global Workshop on Digital Soil Mapping**
Århus, Denmark, June 27 - July 1, 2016. Topics include: Data collection, acquiring new input information and auxiliary data (especially remote sensing, proximal soil sensing, digital terrain model data, citizen science 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), GlobalSoilMap project. Please visit the webpage for further info: *http://digitalsoil.auinstallation35.cs.au.dk/digital-soil-mapping-workshop-2016/*

**EUROSOIL 2016**
Istanbul, Turkey, July 17-22, 2016. The EUROSOIL 2016 Conference will be a unique opportunity to all participants (including young soil scientists, researchers, technical and Professional operators, company representatives and policy makers) to share their projects, scientific experiences, innovations and ideas about soil science. Deadline for Submission of abstracts was 15 November 2015. The Conference organisers are open to receive suggestions about timely topics in soil science that could be included in the scientific programme. The registration system is available as of mid November 2015. Read more: *http://www.eurosoil2016istanbul.org/*

**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. Conference Registration opens Feb 1, 2016; Abstract Submission and Early Registration closes May 1, 2016; Online Pre-registration closes July 10, 2016. 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 – Call for abstracts**
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 Anna M. Romaní, Paolo Nannipieri, Ellen Kandeler, Richard Burns, Petr Baldrian, Katherne Riedel, Peter N Golyshin, E. Blagodatskaya, Carmen Trasar Cepeda, David Hopkins, Shiping Deng, Chris Freeman and Carol Arnosti.
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: Hot Spots - Hot Moments of Enzyme Activities in the Environment; Methods I: Beyond Genomics; Extracellular Enzyme Expression;
Methods II: Roundtable Position Presentations: Omics and Functional Expression of
Extracellular Enzymes; Extracellular Enzymes in Aquatic and Terrestrial Ecosystems under a Changing Climate; Aquatic Enzymology; Functional Diversity and Ecosensors; Bioinformatics: Bioprospecting Genetic Expression of Extracellular Enzymes; Industrial and Environmental Applications; Bioremediation Driven by Extracellular Enzymes. Ab-

stracts to be considered for Oral Presentations are due 15 February, 2016 and for Posters, the due date is April 15, 2016.
Read more: *http://enzymes-in-the-environment.org/*

**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*.

**Meeting of the IUSS Commission Soil Classification** ; 1 - 7 December 2016, Bloemfontein, South Africa. There is a four day tour that starts December 1 in the morning in Johannesburg and ends December 4 in the evening in Bloemfontein. In Bloemfontein we will have the meeting from December 5 in the morning (including a celebration of the World Soil Day) to December 7 in the evening. Main organizer is Cornie van Huyssteen. Details will be announced later. (Please note, that these data differ from the data, which we provisionally announced).

**15th International Conference on Soil Micromorphology**
1st announcement; Universidad Nacional Autónoma de México (UNAM), Colegio de Postgraduados, Mexico city, November 27 – December 5, 2016, with mid-and post-conference field trips; read more: *http://www.iuss.org/files/announcement_15icsm_fin.pdf*

## 2017

**1st World Conference on Soil and Water Conservation under Global Change - CONSOWA**, Lleida, Spain, June 12-16, 2017. The first announcement can be downloaded from the IUSS website: *http://www.iuss.org/files/1st_announcement_consowa_lleida_2017.pdf*. More information: *http://www.consowalleida2017.com/*

**Second Global Workshop on Digital Soil Morphometrics**
The James Hutton Institute in Aberdeen, Scotland UK, 20-23 June 2017. For more information see *www.digitalsoilmorphometrics.org*

## 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.21wcss.org* or contact Flavio Camargo, Vice President Congress, at *fcamargo@ufrgs.br*

# New Publications

**Soil Chemistry**, 4th Edition by Daniel G. Strawn, Hinrich L. Bohn, George A. O'Connor, June 2015, by Wiley-Blackwell. 392 pages, ISBN: 978-1-118-62923-9. Paperback €56.30, Hardcover €125.00. Soil Chemistry 4e provides comprehensive coverage of the chemical interactions among organic and inorganic solids, air, water, microorganisms, and the plant roots in soil. The fourth edition of Soil Chemistry has been revised and updated throughout and provides a basic description of important research and fundamental knowledge in the field. The text covers chemical processes that occur in soils, including: distribution and species of nutrients and contaminants in soils; aqueous chemistry of soil solutions and mineral dissolution; oxidation and reduction reactions in soils; soil mineral formation processes and properties; the formation and reactivity of soil organic matter; surface chemistry and cation, anion, and organic compound adsorption reactions; modelling soil chemical reactions; and reactions in acid and salt affected soils. Although extensively revised with updated figures and tables, the fourth edition maintains the focus on introductory soil chemistry that has distinguished earlier editions. New chapters on properties of elements relevant to soil chemistry, and a chapter with special focus on soil surface characteristics have been added. Special Topics boxes are also included in the Fourth Edition that includes examples, noteworthy topics, and case studies. End of chapter questions are included as a resource for teaching.

**Determination of Metals in Natural Waters, Sediments and Soils** by T. R. Crompton, June 2015, Elsevier. 318 pages, ISBN: 978-0-12-802654-0. Hardcover €79,01. The book provides analytic labs with a comprehensive overview of the various methods available for analysis of metals and serves as a manual to determine metal concentrations in different media such as natural waters, waste waters, sediments and soils. The book begins with a discussion of sampling techniques and preservation and then covers metals in rivers, surface ground and mineral waters and metals in aqueous precipitation. It concludes with detailed information on analysis of metals in sediments. Determination of Metals in Natural Waters, Sediments and Soils provides a foundation for informed action by environmental interest groups and regulators and a starting point for further study by graduate students, professionals, and researchers.

**Understanding Mountain Soils**
This publication offers technical insight on the sustainable management of mountain soils and was launched June 22,2015 during the Global Soil Partnership Plenary Assembly in Rome at the Food and Agriculture Organization of the United Nations (FAO). The book is a contribution to the International Year of Soils 2015, and has been jointly issued by the FAO, the Mountain Partnership Secretariat, the Global Soil Partnership and the University of Turin. The book describes the main features of mountain soil systems, their environmental, economic and social values, the threats they are facing and their cultural heritage. Case studies provided by Mountain Partnership members include how shade-grown coffee in Panama improves soil conservation, nuclear techniques that tackle soil erosion in Viet Nam and indigenous approaches in Garhwall, India, that benefit biodiversity and soil quality. The book recommends a "landscape approach" for the provision of ecosystem services, promoting mechanisms that compensate mountain communities for the carbon sequestration, biodiversity conservation, erosion control and protection of water sources that their sustainable soil-management systems produce. It also recommends the adoption of appropriate policy measures for people working and living in mountain areas, including indigenous communities and rural women. Please follow this link to download the publication: *http://www.mountainpartnership.org/news/news-detail/en/c/295710/*.

**Soil-Specific Farming: Precision Agriculture** by Rattan Lal, B.A. Stewart, July 17, 2015 by CRC Press, Series: Advances in Soil Science. 431 Pages - 119 B/W Illustrations, ISBN 9781482245349 - CAT# KE26526, Price (hardback): BP 75,65. Faced with challenges of resource scarcity and environmental

degradation, it is important to adopt innovative farming systems that maximize resource efficiency while protecting the environment. This volume focuses on principles and applications of soil-specific farming, providing information on rapidly evolving agricultural technologies. The book specifically addresses assessments of soil variability and application of modern innovations to enhance use efficiency of fertilizers, irrigation, tillage and pesticides through targeted management of soils and crops. Support tools are utilized to target site-specific constraints.

**Innovative Strategies and Policies for Soil Conservation** by Michael A. Fullen, Joseph Famodimu, Theodore Karyotis, Christos Noulas, Andreas Panagopoulos, José L. Rubio & Donald Gabriels (Editors) by CATENA Verlag GmbH – Geoscience Publisher in 2015. Advances in GeoEcology 44; about 300 pages, numerous figures and tables; ISBN 978-3-923381-62-3, US ISBN 1-59326-266-3, list price: EUR 149.-; standing order rate Advances in GeoEcology: 30% off. This book, a special issue of Advances in Geoecology, contains several peer reviewed paper presented at the 6th International congress of the European Society for Soil Conservation (ESSC). Many of them are interconnected with the "Innovative Strategies and Policies for Soil Conservation" in Europe and offer reflections and recommendations on soil issues that need to be addressed considering that Soil Science nowadays has a crucial role to play in achieving sustainable systems of use and management of the landscape that meet the needs of an increasingly global and technological society.

**Soil hydrological impacts and climatic controls of land use and land cover changes in the Upper Blue Nile (Abay) basin**: UNESCO-IHE PhD Thesis [bold] by Ermias Teferi Demessie; August 18, 2015 by CRC Press. 240 Pages, ISBN 9781138028746. Paperback, price: GBP £49.29. The study was conducted on the headwater area of the Blue Nile river, which is the runoff and sediment source of the downstream Nile basin countries (i.e. Egypt and Sudan). It represents the first attempt to assess how land change affects and interacts with land degradation, soil hydrology and climate (variability) in the Upper Blue Nile basin. New pedotransfer functions (PTFs) are developed and verified for high altitude tropical soils of data scarce areas for assessing soil water availability and retention.

**Labile Organic Matter—Chemical Compositions, Function, and Significance in Soil and the Environment**, SSSA Special Publication 62, 2015, published by: Soil Science Society of America, Inc. Because of its dynamic nature, labile organic matter is a key player in ecological and environmental phenomena in terrestrial and aquatic ecosystems. Editors Zhongqi He and Fengchang Wu include contributions from more than 30 senior researchers and innovative junior investigators from six countries. A timely synthesis of recent research, this book shows an appreciation for the remarkable range of wet chemistry and advanced instrumental techniques available for labile organic matter research. With issue-oriented comprehensive reviews and problem-solving case studies, this collection brings together soil and aquatic scientists to provide a comprehensive understanding and guidelines for managing the sources and fates of labile organic matter. This book will serve as a valuable reference source for university faculty, graduate students, soil scientists, ecologists, limnologists, marine scientists, environmental scientists, agricultural engineers, and any who work with various aspects of labile organic matter in the environment. IN PRESS! This book is being published according to the "Just Published" model, with more chapters to be published online as they are completed. For more details see: *https://dl.sciencesocieties.org/publications/books/tocs/sssaspecialpubl/sssaspecpub62*

**Soil Science and Plant Nutrition special issue on 'Soils of anthropized environments' and 'Special section of key note lectures during last WCSS in Jeju, South Korea'**, published by Taylor & Francis Asia Pacific, Singapore. More at *http://explore.tandfonline.com/page/est/sspn-wscc*

**ASA (American Society of Agronomy), CSSA (Crop Science Society of America), and SSSA (Soils Science Society of America) to launch new open access journal** Agricultural & Environmental Letters (AEL), a new digital journal, was officially launched on Sept. 1, 2015. Agricultural & Environmental Letters is an open access journal that will publish broad-reaching, exceptionally interesting, transformative, and timely research on major scientific, policy, and economic issues that span the entire range of the agricultural and environmental sciences. Rapid global communication is becoming more important, and AEL has been created to facilitate this communication. Learn more here: *https://dl.sciencesocieties.org/story/2015/aug/mon/asa-cssa-and-sssa-to-launch-new-open-access-journal*

**Volcanic Rocks and Soils**

byTatiana Rotonda, Manuela Cecconi, Francesco Silvestri, Paolo Tommasi. September 15, 2015 by CRC Press, 200 pages, ISBN 9781138028869. Price Book + CD 124,10 £. Volcanic rocks and soils show a peculiar mechanical behaviour at both laboratory and in-situ scale due to their typical structural characters. Volcanic rocks and soils contains keynote lectures and papers from the International Workshop held in Ischia (Italy), 24-25 September 2015. The book deals with recent developments and advancements, as well as case histories, in the geotechnical characterization and engineering applications related to volcanic formations. Volcanic Rocks and Soils is of interest to scientists and practitioners in the fields of rock and soil mechanics, geotechnical engineering, engineering geology and geology.

**Biochar: Production, Characterization, and Applications**

by Yong Sik Ok, Sophie M. Uchimiya, Scott X. Chang, Nanthi Bolan. September 18, 2015 by CRC Press, Series: Urbanization, Industrialization, and the Environment, 416 pages, 5 color & 63 B/W illustrations, ISBN 781482242294. Price Hardcover 54,39 £. Biochar: Production, Characterization, and Applications covers the fundamentals of biochar including its concept, production technology, and characterization. The book builds on this foundation by providing examples of state-of-the-art biochar application technology in agronomy and environmental sciences, along with detailed case studies. Edited by a group of well-known biochar experts and including chapters written by a group of international experts in their field, this valuable resource can be used both as a textbook for graduate courses or as a handbook for policy makers and practitioners in the field.

**Soil Liquefaction: A Critical State Approach, Second Edition**

by Mike Jefferies, Ken Been. September 21, 2015 by CRC Press, Series: Applied Geotechnics, 690 pages, 386 B/W illustrations, ISBN 781482213683. Price Hardcover 102,00 £. Soil Liquefaction has become widely cited. It is built on the principle that liquefaction can, and must, be understood from mechanics. This second edition is developed from this premise in three respects: with the inclusion of silts and sandy silts commonly encountered as mine tailings, by an extensive treatment of cyclic mobility and the cyclic simple shear test, and through coverage from the "element" scale seen in laboratory testing to the evaluation of "boundary value problems" of civil and mining engineering. As a mechanics-based approach is necessarily numerical, detailed derivations are provided for downloadable open-code software (in both Excel/VBA and C++) including code verifications and validations. The "how-to-use" aspects have been expanded as a result of many conversations with other engineers, and these now cover the derivation of soil properties from laboratory testing through to assessing the in situ state by processing the results of cone penetration testing. Downloadable software is supplied on *www.crcpress.com/product/isbn/9781482213683*.

**Advances in Agronomy, 1st Edition**

edited by Donald L. Sparks, expected release date: 01 Oct 2015. Academic Press, 262 pages, ISBN 9780128033234. Price Print Book 117,30 €. Advances in Agronomy continues to be recognized as a leading reference and a first-rate source for the latest research in agronomy. Each volume contains an eclectic group of reviews by leading scientists throughout the world. As always, the subjects covered are rich and varied and exemplary of the abundant subject matter addressed by this long-running serial.

**The Soils of Spain**

edited by Gallardo, Juan F., Oktober 25, 2015. World Soils Book Series, Springer, ISBN 978-3-319-20540-3. Price Hardcover 99,99 €. This book provides the reader with a comprehensive overview of the soils of Spain gathered by a variety of Spanish experts in the field. It presents soils in this country as particularly conditioned by the naturally diverse and drastic distribution of the Spanish landscape, characterized by mountainous ranges in the North, and arid areas in the South and the East. The first chapter sets the agricultural scenario in Spain as influenced by the Arabic culture and American agricultural products; the second chapter provides a classification and distribution of Spanish soils; the third chapter approaches the topic of soils in the characteristically humid Northern Iberia area as prone to diversity and soil evolution; the fourth focuses on the soils of the South and East of Spain as affected by lack of rainfall and abundance in calcic soil horizons; the fifth chapter deals with Mediterranean soils, having as a particular characteristic the dominance of red colors; and the last chapter discusses the challenges and future issues of Spanish soils.

**Land-Use Change Impacts on Soil Processes - Tropical and Savannah Ecosystems** edited by F Brearley, Manchester Metropolitan University, A Thomas, Aberystwyth University, UK. September 2015, 200 pages, ISBN 9781780642109. Price Hardback € 90,00. This book examines the effects that land-use changes (notably agricultural intensification, logging, soil erosion, urbanisation and mining) have on soil characteristics and processes in tropical and savannah environments. It covers a range of geographical regions and environments as impacts of land use change are often site specific. The effects of land use change on various aspects of the soil ecosystem from both a chemical and biological perspective will be examined.

**Soil Change Matters**; Soil Research Special Issue, Volume 53, Number 6 edited by Richard MacEwan. October 2015 by CSIRO Publishing, 140 pages; ISBN: SR53/06 - AU $ 75.00. In March 2014, an international workshop 'Soil Change Matters' was convened to explore current scientific knowledge of soil change as well as the policy contexts to support soil information, soil monitoring and soil management. This special issue addresses important aspects of soil change, ranging from the use of soil chronosequences to study long term changes, through long term field trials to shorter duration surveys and environmental reporting. Soil carbon is featured strongly in the workshop presentations given the current focus on climate issues and C retention in soils. A salutary discussion of the sources of uncertainty in measurement and models provides an important counterpoint to the generalities used in reporting and predicting soil change.

**Integrated Management of Salt Affected Soils in Agriculture - Incorporation of Soil Salinity Control Methods**
1st Edition by Nesreen Ahmen Abou-Baker and Ebtisam El-Dardiry. Release Date: 05 Oct 2015. Academic Press, 78 pages, ISBN: 9780128041659. Price Print Book 24,61 €. Integrated Management of Salt Affected Soils in Agriculture is a concise guide to evaluating and addressing soil issues related to saline content. Methods focused, the book combines agricultural and soil-based insights to efficiently remediate salt-affected soil. Environmental stress conditions such as salinity have a devastating impact on plant growth and yield, causing considerable loss to agricultural production worldwide. Soil salinity control prevents soil degradation by salinization and reclaim already saline soils. This book will help develop the proper management procedures, to solve problems of crop production on salt-affected soils.

**Unsaturated Soil Mechanics - from Theory to Practice: Proceedings of the 6th Asia Pacific Conference on Unsaturated Soils** (Guilin, China, 23-26 October 2015) by Zhenghan Chen, Changfu Wei, De´an Sun, Xongfu Xu. October 14, 2015 by CRC Press, Reference - 906 Pages, ISBN 9781138029217. Price Hardback 156,40 £. Unsaturated Soil Mechanics - from Theory to Practice collects more than 140 technical papers, and 10 invited and keynote lectures presented at the sixth Asia-Pacific Conference on Unsaturated Soils (Guilin, China, 23-26 October 2015). The first Asia-Pacific distinguished lecture, launched at the conference, is also included. The contributions address the fundamental behavior of unsaturated soils, and present theoretical and numerical modeling and engineering applications. The topics of concern span the full spectrum from theory to practice, with strong relevance to the problems in the region and beyond such as collapse/swelling, freezing/thawing, desiccation shrinkage, rainfall-induced slope failure, contaminant transport, shale gas extraction and so on, largely representing the latest developments in unsaturated soil mechanics.

**Agricultural and Environmental Applications of Biochar: Advances and Barriers**, SSSA Special Publication 63, 2015, published by Soil Science Society of America, Inc. (in press). Discover the mechanisms and processes of biochar amendment for achieving stunning agricultural and environmental benefits. Composition and characteristics of biochar, its interactions with contaminants and soil constituents, and its transformation in the environment are illustrated. With chapters by 57 accomplished international researchers, the book presents a whole picture of biochar in improving soil physical, chemical, and biological quality and animal health, reducing soil greenhouse gas emissions, and decontaminating stormwater and mine sites. Readers will appreciate the comprehensive review on the up-to-date biochar research and application and gain critical guidance in best biochar generation and utilization. This book is being published according to the "Just Published" model, with more chapters to be published online as they are completed. Table of Contents: *https://dl.sciencesocieties.org/publications/books/tocs/sssaspecialpubl/sssaspecpub63*.

**Soils of Georgia**

by Tengiz F. Urushadze and Winfried E.H. Blum; published in the Series "Air, Water and Soil Pollution Science and Technology" by Nova Science Publishers, Inc. New York, 2014. ISBN: 978-1-63177-475-9. Price 170 US$. The book has 242 pages, with numerous coloured maps and soil pictures and contains after a general introduction and presentation of the authors 6 main chapters: 1) Physiography and Factors of Soil Formation, 2) The Soils of Georgia, 3)Ecological conditions, 4) Soil Use, 5) References, and 6) Soil photos. A comprehensive Index at the end facilitates the general understanding and the geographical localisation of the soils within Georgia.

**Soil hydrological impacts and climatic controls of land use and land cover changes in the Upper Blue Nile (Abay) basin**

By Ermias Teferi Demessie, October, 29, 2015 – CRC Press, UNESCO-IHE PhD Thesis Series, 264 pages, ISBN: 9781138028746. Price Paperback 89,95 US$. This thesis investigates LULCC and its links with soil hydrology, soil degradation and climate variability through combining results from fieldwork, laboratory work and Remote Sensing. Seasonal, interannual and broad timescale land transitions are analyzed for a robust identification of biophysical change. The determinants of LULCC are determined using spatially explicit statistical modelling of most systematic land transitions. This thesis explores soil hydrological impacts of LULCC for a better soil water management. The thesis further explores the climatic factors leading to the observed trends in vegetated land cover for improved understanding of the link between climate and carbon fixation and water use by vegetation.

**Update 2015 to the third edition of the WRB 2014**

The WRB (World Reference Base) Board has prepared the Update 2015 to the third edition of the WRB 2014. It provides some corrections and, especially, some amendments.

The WRB site at FAO is here: *http://www.fao.org/soils-portal/soil-survey/soil-classification/world-reference-base/en/*

The direct link to the pdf is here: *http://www.fao.org/3/a-i3794e.pdf*

Thanks to Ronald Vargas from FAO for his support.

**Task Force: Soil Matters – Solutions under foot**

Edited by Stephen Nortcliff on behalf of the International Union of Soil Sciences, Nov. 2015, Catena Verlag, GeoEcology Essays. 160 pages, numerous figures, photos, tables. ISBN 978-3-923381-63-0. Price Paperback 14,90 EUR. Contact for order: *catenaverl@aol.com*. This collection of papers seeks to illustrate the diversity of the soils and soil functions and shows the importance of soils for all aspects of our lives. The eight sections of the book deal with soil threats, soil carbon, biodiversity, land use and the environment as well as society. Soil value and ecosystem services as well as the international year of soils are specific topics of this book.

# Miscellaneous

## *A poem on soil genesis*

Soil—genesis?
a soil redox poem*
*Barret Wessel, Doctoral Student*
*University of Maryland, USA*

Once there was a rocky planet, covered in basalt and granite,
Recently accreted from chondritic and achondritic spoil,
Acting on this newborn surface, forces of constant disturbance,
Began their action weathering, weathering the rock to soil.
Yet the planet was not ready, ready to form any soil;
Regolith, and nothing more.

Then life arose, a newborn change, filling its oceanic range,
Powered by redox chemistry through ceaseless chemical reactions.
Finding electron acceptors, free high delta-G acceptors,
And electron donors, donors to complement half-reactions,
Life was good at finding new ways, ways of energy extraction.
Lithotrophs, and little more.

Wächtershäuser's big idea, that the oldest fossil stria,
Was left by microbes of the iron-sulfur hydrothermal roil,
Indicates organic matter, made from carbon in this splatter,
Carbon oxides, oxidizing agents in the almost-boil,
Paired with sulfide-sulfur, reducing agent; still no soil.
Sediment, and nothing more.

Though the details are lost to time, lost to eons of changing clime,
We know two point five billion years ago photosynthesis evolved.
Organic matter filled the seas, and chemotrophs it did appease,
O2 reduced by oxidizing metal atoms once dissolved.
When the system saturated, it showed a problem left unsolved.
Anaerobes, and little more.

**Chemical formulas and acronyms should be read as written; ex. O2 reads "oh two", not oxygen. Written for Dr. Bruce James' course in soil chemistry.*

The oxygen catastrophe, destroyed most life most callously,
Forcing evolution of enzymes to deal with this new toxin.
Thus arose microbes aerobic, no longer oxygen phobic.
As an electron acceptor, O2 has assumed its station,
Metabolism driven by the delta-G of respiration.
Soil genesis, in sight.

With light and oxygen at hand, organisms spread to the land,
Photosynthesis driving organic matter accumulation.
Finally the land had soil, plants evolved, died, became oil.
In the places with poor drainage, more water than that of hydration,
Once the oxygen is gone, Eh drops, denitrification.
Wetland soils, soon to be.

As nitrate becomes ammonia, you might smell a new aroma,
Though at pH 7 manganese gains electrons after nitrate
Eh still falls, as does pe, the same phenomena you see,
Already blackish brown is gone, then iron two too will migrate,
This all requires SOM, perhaps some is carbohydrate.
Carbon, here gives electrons.

Now the soil has gley color, and we can reduce another,
Though water table fluctuation may cause mottles to appear,
Sulfate next, reduced to sulfide, reduced to hydrogen sulfide,
Except around aerenchyma, plant roots where metals may adhere,
All of these redoximorphic features and hydrophytes make clear,
Wetland soils, here we have.

Carbon next reduced by carbon, methanogenesis a bargain
For those microbes who have nothing left but CO2 and SOM.
Then in very rare conditions, protons take electron addition,
Becoming H2 gas and leaving, perhaps from some bucolic fen.
And where we are on this spectrum, we can tell with platinum
Measure voltage, solve log K.

And thus concludes this epic tale, I hope it hasn't seemed too stale.
But what, you ask, would happen if the soil should drain out?
Why, the process then reverses, O2 the soil intersperses
Metal ions are oxidized and coat particles all about,
Should this go on for long enough, one day non-hydrophytes may sprout.
Soil, dynamic, alive.

# Soil Science Loses One of Its Giants Nyle Brady

## 1920-2015

Soil science has lost one of its giants. Nyle C Brady passed away on 24 November 2015 at the age of 95. Dr. Brady was a global leader in soil science, in agriculture, and in humanity. He was born in 1920 in the tiny rural town of Manassa, Colorado, USA. He earned a BS degree in chemistry from Brigham Young University in 1941 and went on to complete his PhD in soil science at North Carolina State University in 1947. Dr. Brady then served as a member of the faculty at Cornell University in New York, USA for 26 years, rising from assistant professor to professor and chair of the agronomy department and finally to assistant Dean of the College of Agriculture. During this period, he was elected President of both the American Society of Agronomy and of the Soil Science Society of America.

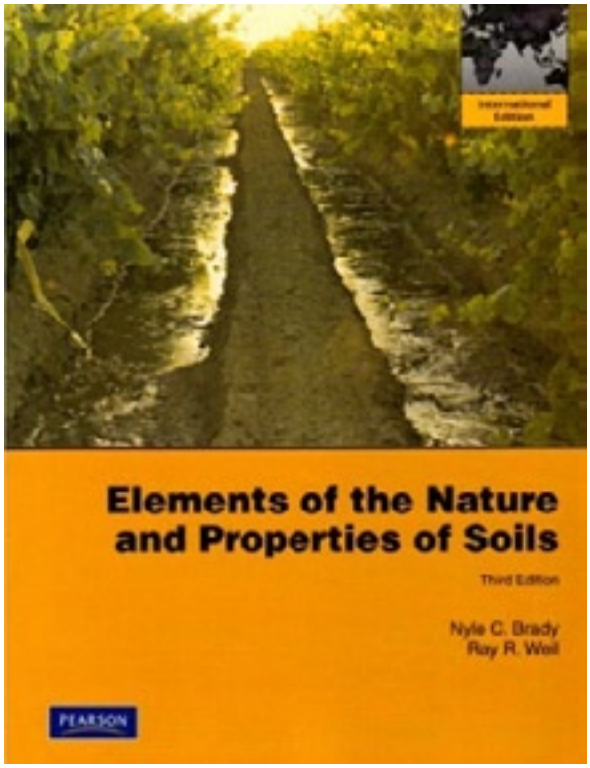
*Nyle C Brady at SSSA Meeting, November 2006*

Soon after arriving at Cornell University he was recruited by Professor Harry O. Buckman to assist in co-authoring the then already classic soil science textbook, *The Nature and Properties of Soils*. The first edition of this textbook to bear Nyle Brady's name as co-author was published in 1952. Under Nyle's hand this book rose to prominence throughout the world and several generations of soil scientists got their introduction to the field through its pages. He was the sole author of editions published between 1974 in 1990. He continued to work on revised editions of this book with co-author Ray Weil until 2004. To this day, Dr. Brady is listed co-author of this textbook and widely known and respected throughout the world in this capacity.

Dr. Brady was of that generation of American soil scientists that contributed so much to the original green revolution. He conducted research into the chemistry of phosphorus and the management of fertilizers and he was an early researcher on minimum tillage. Known for his active interest in international development and for his administrative skills, he was called in 1973 to the International Rice Research Institute (IRRI) in the Philippines to become its third Director General. During his eight years as Director General at IRRI he pioneered numerous major advances that would have significant impacts in soil science in rice production. At a time when China was still quite closed to the outside world, Nyle Brady worked to begin collaborations between IRRI and agricultural scientists in that country, leading a seven-member delegation to visit China in October of 1976. Dr. Brady also pioneered new cooperative relationships between IRRI and the national agricultural research institutions in many Asian countries. He oversaw the transition to a second-generation of green revolution soil management and plant breeding designed to overcome some of the shortcomings of the first generation.

After leaving IRRI, he moved to Washington, DC, where he served as Senior Assistant Administrator for Science and Technology at the U.S. Agency for International Development from 1981 to 1989. He was a fierce champion of international scientific cooperation to promote sustainable resource use and agricultural development. He often stuck his

neck out to defend US government scientific and technical assistance to the developing world when these programs were being strongly criticized by some at home as destroying markets for US agricultural goods and creating competitors for the US agricultural industry. At his urging, the US National Research Council funded a study on Alternatives to Slash and Burn Agriculture. That study stimulated much activity in international research centers and eventually led to many of the programs that were championed at the International Center for Agroforestry Research. Dr. Brady was also an outspoken advocate for sustainable agriculture at a time when many of his peers were fighting a rear guard battle against forces that were calling for agriculture to be based more strongly on ecological principles. During the 1990's Dr. Brady, then in his 70's, served a senior international development consultant for the United Nations Development Programme (UNDP) and for the World Bank, in which capacity he continued to promote scientific collaboration in advances in environmental stewardship and agricultural development.




*Cover of one of Nyle Brady's textbooks.*

Dr. Brady was a strong defender of science in general and in soil science in particular. Yet he was always open-minded and ready to accept new truths supported by scientific evidence. This can be seen in the way that the discussion of topics such as pesticide use, fertilizer management, manure utilization, tillage, soil organic matter and soil acidity management in *The Nature and Properties of Soils* evolved under his guidance for more than half a century. Nyle Brady had a larger-than-life personality, a deep sense of empathy, and an incredible understanding of how to work with people to get positive results. He was the kind of person that friends, associates and even strangers would go to for advice when they found themselves in a perplexing position as a scientist, administrator or even in their personal life. His sound advice and support for many leading soil scientists has multiplied and kept alive his legacy, worldwide. Dr. Brady is survived by his beloved wife, Martha, two daughters, a son (a second son preceded him in death), 22 grandchildren and 90 great grandchildren. He will be very much missed for a long time to come by his family and by all who knew him or were touched by his work.

*By Ray R. Weil, Professor of Soil Science at the Dept. of Environmental Science & Technology, University of Maryland, College Park, Md, 20742, USA*

# In Memoriam
# Dr. Marcel Jamagne
## (1931 - 2015)

The IUSS Secretariat was sad to learn that our distinguished colleague Dr. Marcel Jamagne passed away on the 30th of September 2015. He was 83 years old. He was the father of soil mapping in France and a leading scientist for harmonized soil databases at the European Union and world level. He had been the president of the French Soil Science Society which organized the World Congress of Soil Science in Montpellier, France, in 1998. He was a member of the French Academy for Agriculture from which he received a gold medal. In 2006, he was awarded honorary member of the IUSS. Marcel Jamagne was a very social person, an excellent soil scientist and indeed one of the pillars of numerous scientific networks on soil. His death is a tremendous loss for the soil pedogenesis and soil mapping community and for soil science in general. Messages to his family can be addressed to: *Dominique.Arrouays@orleans.inra.fr*

# In Memoriam Fiorenzo Mancini

## (1922 - 2015)

Fiorenzo Mancini, emeritus professor at the University of Florence (Italy), died April 18, 2015.

He was born in Florence. Graduated (1946) summa cum laude in Agricultural Science, he performed all his academic career (which began in 1948 as an assistant to Prof. Paolo Principi), at the University of Florence. During his long career, Prof. Mancini published over one hundred scientific papers. His major contributions, which have considered the several fields of natural, geological, agricultural and environmental sciences, testify for his multipurpose scientific personality.

The most important areas of investigations in which he has been involved were:
Pedology, with particular regard to the genesis and evolution of soil from different substrates, and geography of soils in many Italian areas;
Soil survey and mapping, in particular the publication of the 1st edition of the Soil Map of Italy (1966) at a scale of 1: 1,000,000; but also, of several Italian areas showing very interesting landscape features;
Geology and geomorphology, with particular reference to the Quaternary. In this context, he never neglected the studies on soil degradation, soil erosion and sediment transport, following his activity as visiting professor to the Soil Conservation Service of the US and in Germany.

Other research areas of his interest concerned geology, paleo-climatology and paleo-ethnology, botany and forestry.

However, soil surveys captured his interest most and he devoted a lot of time to this activity, leading him first to the creation of a National Centre for the Study of Soil Genesis, Classification and Mapping at the Italian National Research Council; then to the organization of the Soil Conservation Special Project, which he led in the years 1978-1982 and, finally to the establishment of the National Pedological Observatory, a special body of the Italian Ministry of Agriculture (1992).

We wish to cite also his many scientific contributions in several international conferences, particularly in the context of the International Society of Soil Science, of which, as the only Italian, he had been appointed Honorary Member at the IUSS Congress in Bangkok (2002).

During his long teaching career at the University of Florence he followed many students in various parts of the Italian territory, meeting and encouraging many young people interested in the study of the soils.

He was the leader of the Committee for the Soil Map of Italy, published in 1966, with the involvement of many Italian scholars.
In this context, he organized several field trips to different parts of the Italian soilscape with groups of FAO soil scientists and in collaboration with many colleagues from different European countries, in particular from the Mediterranean Countries.

In his long career, Fiorenzo Mancini has held several important positions in national and international scientific institutions (SISS, IUSS, FAO, AIQUA, Soc. Studi Geografici, SGI, Accademia dei Georgofili, Accademia di Scienze Forestali, Accademia Italiana di Agricoltura, ISSDS).

He was President (1973-76) of the Italian Society of Soil Science; Director and President (1968-70) of the Italian Geological Society; Consultant of the National Commission of Major Catastrophes (1990-92). He was also Vice President of the Academy of Georgofili, President of the Italian Academy of Forestry Sciences, Academician Professor and Director of the Italian Academy of Agriculture, President of the Experimental Institute for the Soil Survey and Conservation.

The Italian scientific community of soil science has recognized his great figure of scientist and naturalist, and his scientific, technical and human merits, for his work during several decades in Italy.
He was a Master of culture and life for all Italian soil scientists.

*Angelo Aru & Claudio Bini*
*Italian Society of Soil Science*

# IUSS Honorary members

| Year | Member | Country |
|---|---|---|
| 1924 | L. Cayeux † | France |
| | K. Glinka † | USSR |
| | Jos. Kopecky † | Czechoslovakia |
| | G. Murgoci † | Romania |
| | E. Ramann † | Germany |
| | Sir John Russell † | UK |
| | S. Winogradski † | USSR |
| 1927 | P. Treitz † | Hungary |
| 1935 | E.A. Mitscherlich † | Germany |
| | A. d'Sigmond † | Hungary |
| | J. Stoklasa † | Czechoslovakia |
| | G. Wiegner † | Switzerland |
| 1950 | A. Demolon † | France |
| | D.J. Hissink † | Netherlands |
| | W.P. Kelley † | USA |
| 1954 | S. Mattson † | Sweden |
| | E. Truog † | USA |
| 1956 | G. Bertrand † | France |
| | E.C.J. Mohr † | Netherlands |
| 1960 | F.A. Bear † | USA |
| 1964 | J.A. Prescott † | Australia |
| 1968 | F. Hardy † | UK |
| | W.L. Kubiena † | Germany |
| | L.A. Richards † | USA |
| | A.A. Rode † | USSR |
| 1974 | R. Bradfield † | USA |
| | G.V. Jacks † | UK |
| | Ch.E. Kellogg † | USA |
| | M.K. Kononova † | USSR |
| | A. Oudin † | France |
| | F. Scheffer † | Germany |
| 1978 | G. Barbier † | France |
| | V. Ignatieff † | Canada |
| | Y. Ishizuka † | Japan |
| | L. Krolikowski † | Poland |
| | L. Vettori † | Brazil |
| 1982 | Ph. Duchaufour † | France |
| | W. Flaig † | Germany |
| | V. Kovda † | USSR |
| | E. Mueckenhausen † | Germany |

| Year | Member | Country |
|---|---|---|
| | E.W. Russell † | UK |
| 1986 | H. Jenny † | USA |
| | D. Kirkham † | USA |
| | S.K. Mukherjee † | India |
| | R. Tavernier † | Belgium |
| 1990 | G. Aubert † | France |
| | E.G. Hallsworth † | Australia |
| | J.S. Kanwar | India |
| | P. Schachtschabel † | Germany |
| | R.W. Simonson † | USA |
| | I. Szabolcs † | Hungary |
| 1998 | G.H. Bolt † | Netherlands |
| | R. Dudal † | Belgium |
| | K.H. Hartge † | Germany |
| | M. Kutilek | Czech Rep. |
| | J. Quirk | Australia |
| | W.G. Sombroek † | Netherlands |
| | K. Wada | Japan |
| | D.H. Yaalon † | Israel |
| | S.V. Zonn † | Russia |
| 2002 | R.W. Arnold | USA |
| | G.V. Dobrovolsky † | Russia |
| | W. Gardner † | USA |
| | H.M. Hamdi † | Egypt |
| | L.A.L. Sarmiento | Colombia |
| | F. Mancini † | Italy |
| | B.S. Nosko | Ukraine |
| | R. Rosell | Argentina |
| | A. Ruellan † | France |
| | A. Tanaka | Japan |
| | P.B.H Tinker | UK |
| 2006 | W.E.H. Blum | Austria |
| | H-P. Blume | Germany |
| | J. Bouma | Netherlands |
| | S-J. Cho † | S Korea |
| | J. Glinski | Poland |
| | M.G.H. Jamagne | France |
| | D.R. Nielsen | USA |
| | J.H.V. van Baren † | Netherlands |
| | 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 |