International Union of Soil Sciences (IUSS)

The IUSS Bulletin is the official Newsletter of the International Union of Soil Sciences. It is freely distributed through the IUSS website. All contributions are welcome and should be sent to iuss@umweltbundesamt.at. The IUSS is on LinkedIn and Facebook.

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IUSS reports

Report from the IUSS Secretariat

IUSS Secretariat

In December 2015, the Secretariat was mainly concerned with preparing and contributing to 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). For details the reader is kindly referred to the last bulletin.

The presentations given during the conference “Celebration of International Year of Soils 2015 – Achievements and Future Challenges” in Vienna on Dec. 7, 2015, were uploaded to the IUSS website together with a selection of photos. Read more:

Vienna Soil Declaration adopted by FAO and IAEA

The ‘Vienna Soil Declaration’ presented during the conference “Celebration of International Year of Soils 2015 – Achievements and Future Challenges” in Vienna on Dec. 7, 2015, has been adopted by FAO and IAEA. In this Declaration IUSS has identified the key roles played by soils in addressing the major environmental, health and social problems which humanity is currently facing. Given this situation, the IUSS believes that it is incumbent on us to not only maintain the level of activity generated in IYS 2015 but to increase the momentum and the extent of our contributions on these issues as we move towards the Centenary of the formation of IUSS in 2024.

International Decade of Soils (2015-2024)

During the above mentioned event IUSS President Prof. Rainer Horn took the opportunity to announce the International Decade of Soils 2015-2024, which was unilaterally declared by IUSS, to keep the momentum and further increase soil awareness. IUSS will seek the support of global organizations such as CGIAR, FAO, IAEA, UNEP and others for this initiative. We kindly ask you to actively support us through the channels at your disposal.

The United Nations’ decision to inaugurate 2015 as International Year of Soils was an important step in raising public awareness. But public concern alone is not sufficient to protect soils and ensure their sustainable use. Soil scientists in every country around the world need to take and to maintain action to ensure that the significance of soils in maintaining healthy life and environment remain continually at the forefront of political and scientific planning and decision making.

In the first half of 2016, the Secretariat was mainly concerned with the preparation of the IUSS representation at the European Geosciences Union (EGU) General Assembly 2016, Vienna, Austria, April 18-22, 2016 (for details please see below); preparation of a profile that was published in Adjacent Government, and last, but not least, the day-to-day running of the Secretariat including regular updating of the website and compiling the monthly Alerts.

IUSS website

The main tasks of the webmaster during the last six months were adding new information to the website (e.g. new events, news), implementing alert news into the content management system and sending out the alerts, further creating new contents eg for the International Decade of Soils and programming it backend, and finally, keeping information of IUSS members updated so that everyone stays informed in an optimal way.

IUSS Stimulus Fund

In 2015 all available funds were disbursed and used for a wide range of activities. In 2016 two requests for co-funding have been approved so far; contributing to a 1-week PhD-summerschool (October 2016) on the use of soilscape evolution models on the one hand, and to 3 fellowships to attend the 15th International Conference on Soil Micro-morphology (Mexico city, Nov 27-Dec 5 2016) on the other.
The next deadline for submission of proposals is 15 September 2016. 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.

 IUSS Profile published in Adjacent Government

As one of the outreach activities during the International Decade of Soils (2015-2024), a two-page profile on the IUSS was published in the May 2016 edition of Adjacent Government, pages 250-251. Read more: http://edition.pagesuite-professional.co.uk/Launch.aspx?EID=e8f6dc5e-d43f-45e6-90b2-7e3a198ad050

 Short report about the ICSU meeting in Paris (11-13 April 2016)

The annual general assembly of ICSU (International Council for Science) took place in Paris and was attended by more than 40 unions and further representatives of national foundations and organisations.

The GeoUnions (GUs) Steering Committee met on 11 April 2016 prior to the ICSU meeting in order to:

a) inform about the ongoing activities of the GU members: GU is a network of representatives of nine international scientific unions, namely IUPS (International Union of Physiological Sciences), URSI (Union Radio-Scientifique Internationale; in English International Union of Radio Science), IUSS (International Union of Soil Sciences), IUGG (International Union of Geodesy and Geophysics), ISPRS (International Society for Photogrammetry and Remote Sensing), ICA (International Communication Association), IUGS (International Union of Geological Sciences), IGU (International Geographical Union), and IAU (International Astronomical Union) of the International Council for Sciences (ICSU) dealing with Earth and space sciences (http://www.icus-geounions.org),

b) discuss for the following ICSU meeting

1. the challenges and opportunities for ICSU and scientific Unions within a shifting global scientific landscape;
2. the place of ICSU and its Unions in the world scientific community;
3. the role of Unions in the activities of ICSU interdisciplinary bodies;
4. the benefits of Unions being under the ICSU umbrella and the benefits of ICSU having Unions as Members;

5. “Open Data Campaign”, a new initiative of the Science International (a coalition of ICSU with other international science organizations);
6. the future of the relationship between ICSU and the International Social Sciences Council (ISSC); and
7. the cooperation with Future Earth and other ICSU interdisciplinary bodies.

IUSS has decided to keep updated about ICSU and its international links, IRDR Future Earth, and interdisciplinary programmes.

The following ICSU Scientific Unions meeting took place at the Fondation Simone et Cino del Duca in Paris, France, on 12-13 April 2016. At the meeting, representatives of the Union Members received updates about ICSU activities since the General Assembly in Auckland in 2014, shared their own reports on major activities. In order to improve the ICSU presentations on international meetings and conferences it was concluded that in future the corresponding unions would be asked beforehand. A particular focus of the discussion was the ongoing process to develop a new strategic plan for the organization. The discussion covered many topics including two central questions: What are the new or emerging global challenges that the international scientific community should be helping to solve? And what kind of actions could the Council take to address those challenges? As a new approach ICSU offered 3 grants (€ 300,000 each for 3 years) for interdisciplinary research meetings on broader topics (main idea; please submit drafts on the following topics until 1 May 2016:

1. Restoration of intensely disturbed landscapes
2. Mapping Geounions to Sustainability Goals
3. Future Earth and Space Science Education

All proposals will be defined until end of July and after further discussions and improvements submitted to the headquarter end of 2016 for final decision.

In conclusion it must be stated that IUSS needs to guarantee continuity and active involvement; the understanding of the ICSU policy needs time and only allows a beneficial involvement in the system in the long run. It is also obvious that the unions can only deliver information if they know each other. Further exchange of information is needed. Within the new strategic plan of ICSU the board promised to include all concerns and will improve their activities and their ways to communicate.
IUSS Presidential elections 2016
The election of the next President of the IUSS is due this year. The appointment of the President represents a total of six years commitment to the Union by serving two years each as President-Elect (2017/18), President (2019/20) and Past-President (2021/22). The call for nominations was published in a separate Alert on 16 March 2016. Full documentation is available on the IUSS website. Read more: http://www.iuss.org/index.php?article_id=582

IUSS booth at EGU General Assembly in Vienna
For the second time, the IUSS successfully presented itself at the European Geosciences Union (EGU) General Assembly 2016, Vienna, Austria, April 18-22, 2016. This time the IUSS booth was on the main exhibition floor, shared by the IUSS, ESSC, BSSS, JSSSPN, JSP, and TMO. EGU 2016 attracted 13,650 participants bringing together geoscientists from all over the world, covering all disciplines of the Earth, planetary and space sciences. The IUSS took this opportunity to present a new flyer and posters of the 4 IUSS Divisions, which were well received. An inflatable globe showing the world’s soils attracted particular attention. Another highlight was the announcement of the International Decade of the Soil with a view to recent achievements and planned future activities. Related information material and copies of the Vienna Soil Declaration were made available. In addition, a questionnaire was distributed among the people visiting the IUSS booth to get information on what participants thought about the success of IYS events and potential IUSS outreach activities. Ideas were sought on how to further promote soil issues. Read more: http://www.iuss.org/index.php?article_id=26

Report of Division 1:
‘Soils in Space and Time’
By Erika Micheli, Division Chair
Division 1 focuses on soils as part of a changing environment. It coordinates and harmonizes research activities on observation, genesis, classification and mapping of the soils and landscapes, as well as communicating results to the soil science community, soil users and to the general public. IUSS Division 1 Soils in Space and Time consists of 6 Commissions and several working groups: Commissions: 1.1 – Soil Morphology and Micromorphology, 1.2 – Soil Geography, 1.3 – Soil Genesis, 1.4 – Soil Classification, 1.5 – Pedometrics, 1.6 – Paleopedology. Working Groups: Cryosols, Digital Soil Morphometrics, Universal Soil Classification, World Reference Base for Soil Resources.

Newsletter of IUSS Commission 1.1:
Soil Morphology and Micromorphology
The spring newsletter of IUSS Commission 1.1 Soil Morphology and Micromorphology was published. It contains a call for nominations for the 2016 Young Micromorphologist Publication Award, an overview of forthcoming meetings, research notes and publications, to name just a few items. Download: http://www.iuss.org/index.php?article_id=419

Commission 1.4 Website Now Available
Commission 1.4 Soil Classification Web Site has been moved. It is now available at https://sites.google.com/a/vt.edu/iuss1-4_soil_classification/. The site is a source of information about upcoming meetings, the Guy Smith Award, the Universal Soil Classification and WRB Working Groups. Contact for information is Chair John Galbraith at john.galbraith@vt.edu.

Pedometron
The newsletter of Commission 1.5 of the IUSS, December 2015 issue is available at www.pedometrics.org. It has exciting articles: Report on Pedometrics 2015, Margaret Oliver Award for Early-career Pedometricians, New science for an old art, The challenge of sampling remote tropical mountain areas, Turning a smartphone into a tricorder for soil monitoring, Is DSM trying to tell us something? On usability of soil maps, Pedometricians Favourite Equations, Digital Soil Mapping Training at The Dokuchaev Soil Science Institute, How Gerard Heuvelink got involved in pedometrics, Geoderma Special Issue on Advances in DSM, Uncertainty and Soil Carbon Validation.
Report of Division 2:
‘Soil properties and processes’

By Kazuyuki Inubushi, Division Chair

Division 2 is concerned with the integration of physics, chemistry, biology, mineralogy and pedogenesis to understand fundamental soil properties and processes that control transport, cycling, speciation and bioavailability of elements or molecules. These phenomena are studied at multiple scales ranging from global to atomic. The division consists of 5 Commissions, i.e. Soil physics (2.1), Soil chemistry (2.2), Soil biology (2.3), Soil mineralogy (2.4), Soil chemical, physical and biological interfacial reactions (2.5).

The main activities of Division 2 during this period were to summarize divisional activities for IYS and to start preparation for the forthcoming 21th IUSS World Congress, Rio de Janeiro, Brazil. Also several international conferences/symposiums/colloquia were prepared for next period, such as the 5th International Conference Enzymes in the Environment: Activity, Ecology and Applications, from 24th-28th July 2016 in Bangor, Wales, UK, coordinated with Commission 2.3; 15th International Peat Congress, from 15th-19th August 2016 in Kuching, Sarawak, Malaysia, organized by the Malaysian Peat Society in partnership with the International Peat Society, XVII International Colloquium on Soil Zoology (ICSZ) and VIX International Colloquium on Apterygota (ICA) 2016, from 22nd-26th August 2016 in Nara, Japan, coordinated with Commission 2.3; 18th International Conference of the International Humic Substances Society (IHSS 18), from 11th-16th September 2016, in Kanazawa, Japan, organized by the Japanese Humic Substances Society in partnership with the IHSS International Society, 6th International Conference on Sustainable Energy and Environment (SEE 2016), from 28th-30th November 2016 in Bangkok, Thailand.

Report of Commission 2.1 Soil physics

By Stephan Peth, Commission Chair

During the International Year of Soils 2015 many projects, conferences, workshops and film contributions were initiated, conducted or produced in which soils were highlighted as the most precious but also vulnerable resource on earth. Some of the activities of the soil physics commission during this period shall be briefly mentioned in the following. During the Global Soil Week held in Berlin from 19 to 23 April we showed a movie on the impact of raindrops falling on the soil surface and the protecting effects of aggregation and mulch on splash erosion and soil slaking. The video was filmed with a high speed camera and is accessible under following link: https://vimeo.com/130951674.

On the occasion of the IYS 2015, our president Prof. Dr. Rainer Horn was invited to give a keynote lecture at the annual meeting of the Hochschulverband Witzenhausen at the University of Kassel where the topic “Soils under pressure – challenges for soils in the 21st century” was discussed between farmers, scientists and journalists. We also actively contributed to various workshops and conferences with podium discussions, keynote lectures and conference contributions: (i) round table discussion on Multiscale Modelling of Root-Soil Interactions based on Pore Scale at the 4th Rhizosphere Conference held from 21 - 25 June 2015 in Maastricht (Netherlands), (ii) Sino-German workshop on Critical Zone Observatories held in Nanjing (China) from 9-14 September 2015, (iii) Tri-annual meeting of the International Soil and Tillage Research Organisation in Nanjing from 14-18 September 2015, (iv) International Congress on the occasion of the IYS 2015 and the 350th anniversary of the Christian-Albrechts-University zu Kiel (Germany) from 23-26 September 2015, (v) International Exploratory Workshop on Quantifying the Role of Biophysical Processes in Soil Structure Dynamics from 14-15 April 2016 in Zurich (Switzerland). Last but not least the Vice-chairman of Commission 2.1 co-authored the recently published FAO report “Status of the World’s Soil Resources”, which provides a description of ten major soil threats and their effects on ecosystem functions and suggests ways to combat soil degradation. Looking ahead there will be a joint DBG/IUSS soil physics commission meeting to be held in Braunschweig (Germany) on 1st/2nd September 2016 with a focus topic on “Biological Control on Soil Mechanical and Hydraulic Properties”. For further details on this upcoming event please visit the following website: https://www.dbges.de/wb/pages/commissions/soil-physics-and-soil-ydrology/activities.php?lang=EN

We hope that the success of the IYS can be extended to the International Decade of Soils and...
that the soil physics community will actively participate in tackling the future challenges of sustainable soil use and management.

**Report of Commission 2.2: Soil chemistry**  
*By Boris Jansen, Commission Chair*

An important development in Commission 2.2 since the publication of the last bulletin is that Philippe Baveye stepped down as Chair of the Commission. As per IUSS regulations, he was succeeded by Vice-Chair Boris Jansen who has taken over his functions as Chair of the Commission per February 2016.

As indicated in the previous bulletin, the Wageningen Soil Conference that was held in August 2015 and was endorsed by the Commission, stressed the importance of the role of soil organic matter dynamics and transformations as a crucial ecosystem service of the soil. Recognition of this is now also gaining momentum outside the direct soil scientific community as for instance illustrated by the 4 per mil initiative (http://4p1000.org/) initiated by the French Minister of Agriculture, Agrifood and Forestry in 2015 that aims to sustainably increase soil carbon stocks worldwide by 4 per mil annually. As a deliverable of the Wageningen Soil Conference, the Chair of Commission 2.2 co-authored a white paper titled: “The significance of soils and soil science towards realization of the United Nations Sustainable Development Goals” that was published in SOIL in the spring of 2016 (open access, download via: http://www.soil-journal.net/2/111/2016/soil-2-111-2016.pdf). The paper emphasizes inter alia the role of soil carbon dynamics.

At the General Assembly of the European Geosciences Union (EGU) in Vienna, Austria in April 2016 several sessions were organized revolving around soil chemistry, including one titled: “Biogeochemical processes in terrestrial ecosystems: New methodological perspectives to trace organic matter cycling and transformation in soils, sediments and the liquid phase”, endorsed by Commission 2.2.

**Report of Commission 2.3 Soil biology**  
*By Ellen Kandeler, Commission Chair*

Commission 2.3 Soil Biology contributed to the conference “Ecology of Soil Microorganisms”, which was held in Prague, Czech Republic, from 29th November to 3rd December 2015. IUSS supported four students with Travel Awards to attend this conference. The conference gave an excellent overview on soil microorganisms within their habitat using the power of molecular and classical methods. IUSS thanks Petr Baldrian, Prague, for the perfect organization of the conference.

The chair of commission 2.3 Soil Biology, Ellen Kandeler, as well as Petr Baldrian will support the local organizers of the 3rd conference “Ecology of Soil Microorganisms” which will be held in Helsinki, Finland in 2017. A further conference is currently planned for July 2016 (“Enzymes in the Environment”) which will be held in Bangor, Wales, and will be organized by our IUSS member Richard Dick. IUSS will finance the Lifetime Achievement Award in Terrestrial Enzymology. An important activity of different members of commission 2.3 was their contribution to the Global Soil Biodiversity Atlas which was launched at the UN Environmental Assembly in Nairobi on May 25th.

**Report of Commission 2.4 Soil Mineralogy**  
*By Balwant Singh, Commission Chair and Stephen Hillier*

Commission 2.4 Soil Mineralogy co-sponsored a symposium workshop on “Clays in the Critical Zone: soils, weathering and elemental cycling” at the Euroclay2015 joint Clay Minerals Society 52nd Annual meeting that was held at Edinburgh University from 5th -10th July 2015 with Stephen Hillier (IUSS Mineralogy Vice-Chair) acting as the conference organising and scientific chair. The 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 the exchange and contribution of CO2 and O2 from plants and atmosphere to soil system had been
largely ignored in the past. The oral presentations in the symposium included diverse topics such as the applications of the 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 hydroxy-interlayered Al, and sorption-desorption properties of minerals. Both oral and poster sessions were well attended and the symposia chairs deserve an 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.

Balwant Singh (Chair of the Soil Mineralogy Commission) delivered the George Brown Lecture (a plenary lecture) “Imperfect Minerals Can Control Soil Fertility and Geochemistry” at Euroclay 2015. He also received the Marion L. and Chrystie M. Jackson Award of the Clay Minerals Society at the conference.

**Report of the Hydropedology Working Group**

*By Henry Lin, Chair of the Hydropedology Working Group of the IUSS*

This report follows the following outlines:
- Summary
- Introduction
- Current Officers
- Activities and Publications
- Conclusion
- References

**Summary**

This report documents the past decade of activities and publications associated with the Hydropedology Working Group of the IUSS. This Working Group was approved by the IUSS in 2005. Since then, a series of activities have been accomplished, along with a number of special publications. Hydropedology as a new interdisciplinary science is now well recognized by many professional societies (such as the Soil Science Society of America, Agronomy Society of America, Crop Science Society of America, Geological Society of America, American Geophysical Union, European Geosciences Union, and International Association of Hydrological Sciences, and others). After a decade of active and productive efforts, the time is now ripe to broaden its scope and impacts among even larger scientific communities to better capture emerging opportunities. Hence, we plan to close this Working Group and will fold it into the proposed new IUSS Commission 2.6 on Systems Soil Science.

**Introduction**

It is well recognized that the progress of science depends increasingly on an advanced understanding of the interrelationships among different disciplines and their interactions (American Association for the Advancement of Sciences Council, 2001). An interdisciplinary systems approach is a proven vehicle for addressing a wide array of complex issues of societal importance, such as agricultural, environmental, ecological, and socioeconomic issues related to sustainability. Soil is at the critical junction of all the spheres in the Earth system, and water is a major driving force and transport agent in the Earth’s Critical Zone (i.e. the most heterogeneous and complex region of the terrestrial Earth from the top of vegetation down to the fresh bedrock; NRC, 2001). The interactions of soil and water are so intimate and complex that they cannot be effectively studied in a piecemeal manner, but rather they should be studied as a system across spatial and temporal scales. In this spirit, hydropedology has emerged in recent years as a synergistic integration of soil science and hydrology that offers a renewed perspective and an integrated approach to understand interactive pedologic and hydrologic processes and their properties in the Critical Zone (Lin, 2003; Wilding and Lin, 2006). There are two fundamental questions that hydropedology addresses: (1) How does soil architecture (ranging from soil pore to landscape scales) control the partitioning of hydrologic fluxes and related biogeochemical and ecological functions in heterogeneous landscapes? (2) How does landscape hydrology and associated transport of energy and mass influence soil genesis, variability, and function across space and time? The first question is related to the soil’s role in water quantity and quality, while the second question is linked to the water’s role in soil quantity and quality.
Fundamentally, hydropedology promotes the needed unification of diverse soil formation and various soil functions, and offers the following unique contributions: 1) connecting fast and slow processes via soil function and soil formation, 2) bridging soil structural and landscape units via deterministic patterns and stochastic variability, and 3) linking mapping with monitoring and modeling through geographic and functional characterizations. In practice, hydropedology improves our understanding of water quantity and quality, soil health and ecosystem services, landscape processes and watershed management, biogeochemical cycling and climate change, crop production and precision agriculture, waste disposal and contaminant fate, among many others. In securing food production and combating looming global freshwater crisis, hydropedology also provides an essential guide to improve the use of green water (i.e., water infiltrated into soils and transpired by plants), wastewater onsite disposal, stormwater management, and drinking water protection. Hydropedology also plays an important role in interdisciplinary teams and panels formed to address complex environmental policy and land use regulations (Bouma, 2006).

Parallel to the development of hydropedology, there are a number of emerging scientific communities and national or international environmental efforts where soil and water play an important role. For example, large-scale environmental monitoring networks have been increasingly called for by various scientific consortia to address “big” science questions in the Anthropocene. In the U.S., for example, Critical Zone Observatories (CZOs) and National Ecological Observatory Network (NEON) have been established in recent years, so are Long-Term Agroecosystem Research (LTAR) Network and various Climate Hubs. At the international level, coordinated efforts such as the Future Earth, the Earth System Science Partnership, the Global Climate Observing System, the Integrated Global Observing Strategy, and the Prediction of Ungaged Basins have also attracted considerable interest. It has become apparent that ample opportunities exist for hydropedology to contribute in a new intellectual paradigm where connections between the pedosphere and the hydrosphere are essential, and their further links to the other spheres of the Earth System are becoming more and more important.

Current Officers
The current executive committee members of the Hydropedology Working Group are:

- Prof. Henry Lin (Chair), Professor of Hydropedology/Soil Hydrology, Department of Ecosystem Sciences and Management, The Pennsylvania State Univ., University Park, PA, USA.
- Prof. Xiaoyan Li (Vice-Chair), Professor of Hydropedology/Ecohydrology, College of Resources Science & Technology, Beijing Normal University, Beijing, China.
- Prof. Hans-Jörg Vogel (Member), Professor of Soil Physics, Helmholtz Centre for Environmental Research – UFZ, Halle, Germany.
- Prof. Brent Clothier (Member), Science Group Leader, Systems Modelling, Plant & Food Research, New Zealand.
- Prof. Quirijn de Jong van Lier (Member), Professor of Soil Physics, University of São Paulo, Brazil.

Activities and Publications
The Hydropedology Working Group of the IUSS has been quite active since its inception in 2005. Nearly 30 activities (1 to 3 per year) and 12 special publications (at least 1 each year) have been accomplished in the past decade. These have had significant and positive impacts on the global soil science community as well as the larger scientific community. The chronological summary of our main activities and associated special publications are listed in Table 1, together with Fig. 1 showing the number of hydropedology papers published and their citations each year and Fig. 2 showing the distribution of these publications from the top 34 countries.

Conclusion
As an emerging intertwined branch of soil science and hydrology, hydropedology is now well positioned to continue its synergistic efforts to bridge pedology, soil physics, hydrology, and other related bio- and geo-sciences toward a holistic understanding of soil-water-landscape-ecosystem relationships. The Hydropedology Working Group of the IUSS has been successful in the past decade since its inception in 2005 and has accomplished a number of activities and publications. Now the time is ripe to broaden its scope and impacts toward an even broader concept of systems soil science, which integrates various sub-disciplines of soil science as well as with other related scientific disciplines. Hence, we plan to close this Working Group and will fold its continued efforts into the proposed new IUSS Commission 2.6 on Systems Soil Science.
<table>
<thead>
<tr>
<th>Year</th>
<th>Activities</th>
<th>Special Publications</th>
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| 2005 | • Formation of the Hydropedology Working Group in the International Union of Soil Sciences (IUSS)  
• Hydropedology session (Multiscale Interdisciplinary Integration of Soil-Hydrology-Plant Interaction) at AGU Spring Assembly  
• Hydropedology special session (Synergistic Integration of Soil Science and Hydrology and Its Roles in Multiscale Environmental Monitoring Networks) at AGU Fall meeting |  
| 2006 | • Hydropedology symposium (Hydropedology: Fundamental Issues and Practical Applications) at the 18th World Congress of Soil Science  
• Hydropedology session (Bridging Hydrology, Soil Science and Ecology: Hydropedology and Ecosystems) at the AGU Fall meeting | Geoderma (Lin et al., 2006) |
| 2007 | • Hydropedology workshop (Frontiers of Hydropedology Research and Applications) at the Chinese Academy of Sciences  
• Hydropedology special session (Hydropedology: A Synergistic Tool to Shape EU Guidelines for Water and Soil) at the European Geosciences Union (EGU) annual meeting | Geophysical Research Letter (Young et al., 2007) |
| 2008 | • The First International Conference on Hydropedology held in the USA  
• Major Geoscience Program (The Earth's Critical Zone and Hydropedology) at the Geoscience World Congress in Norway  
• Hydropedology symposium (Hydrogeomorphology and Hydropedology: Emerging Disciplines that Embrace Earth and Soil Sciences) at the joint annual meetings of GSA and SSSA | Catena (Lin et al., 2008) |
| 2009 | • Hydropedology symposium (Hydropedology – Linking Hydrology and Pedogenic Processes across the Landscape: Upland, Wetland, and Subaqueous Soil Systems) at the ASA-CSSA-SSSA annual meetings | Hydrology and Earth System Sciences (Lin et al., 2009) |
| 2010 | • Hydropedology symposium (Architecture of Soil Structural Diversity: From the Nano to the Landscape Scale) at the 19th World Congress of Soil Science  
• International workshop (Frontiers of Hydropedology and Earth’s Critical Zone: Research and Applications) at Beijing Normal Univ.  
• Hydropedology symposium (Hydropedology–Coupling Hydrology and Pedology across Landscapes) at the ASA-CSSA-SSSA annual meetings | J. Hydrology (Lin et al., 2010) |
| 2011 | • Hydropedology special session (Interdisciplinary Sciences in Critical Zone Observatories) at the AGU Fall meeting | Vadose Zone J. (Lin et al., 2011) |
| 2012 | • The Second International Conference on Hydropedology held in Germany | Hydropedology (edited book; Lin, 2012) |
| 2013 | • Hydropedology symposium (Hydropedology – 10 Years in the Past and 10 Years into the Future) at the ASA-CSSA-SSSA annual meetings  
• Hydropedology special session (Hydropedology: Synergistic Integration of Soil Science and Hydrology in the Critical Zone) at AGU Fall meeting  
• International workshop (Hydropedology and Integrated Natural Resources Management) at Beijing Normal Univ. | Vadose Zone J. (Vogel et al., 2013) |
| 2014 | • Hydropedology symposium (Unique Contributions of Hydropedology to Integrated Soil and Water Sciences) at the 20th World Congress of Soil Science  
• Hydropedology symposium (Soil Hydrology – Patterns and Process Interactions in Space and Time) at the ASA-CSSA-SSSA annual meetings  
• Hydropedology related symposium (Quantification of Soil Development and Pedogenesis in the Quaternary) at the annual meetings of Geological Society of America | Ecological Modelling (Lin et al., 2014); |
| 2015 | • Hydropedology related symposium (Long-Term Terrestrial Observatories: Outdoor Laboratories for Soil-Plant-Atmosphere Interactions) at the ASA-CSSA-SSSA annual meetings  
• Hydropedology related session (Hydrogeophysical Characterization of the Critical Zone) at the AGU Fall meeting | SSSAJ (Lin et al., 2015); Hydrological Processes (Lin et al., 2015) |
| 2016 | • The Third International Conference on Hydropedology to be held in Beijing, China  
• Hydropedology related session “Eco-hydrological modeling” at the International Society for Ecological Modelling Global Conference, May 5-12, 2016, Towson, MD  
• Hydropedology related session “Preferential Flow and Transport across Scales in the Critical Zone” at the AGU Fall meeting | Science of the Total Environment (Mallants et al., 2016) |

Table 1. A brief summary of main activities and special publications associated with the Hydropedology Working Group of the IUSS since 2005.
Fig. 1. Cumulative distribution of the number of hydropedology papers published since 2003 till the end of 2015 and their citations each year (based on the ISI Web of Science™ using the topic search of “hydropedology or hydropedologic or hydropedological”). The sum of the times cited of all these 149 papers was 1,682 (as of May 28, 2016), with an average citations per item 9.78, total citing articles 1,268, and h-index 21.

Fig. 2. Distribution of hydropedology papers published since 2003 until the end of 2015 among the top 34 countries (based on the ISI Web of Science™ as of May 28, 2016).
References


Looking back at 2015
International Year of Soils

2015 was the International Year of Soils. The IUSS and with it, many cooperating organizations celebrated 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. Further information on the IUSS activities can be found here http://www.iuss.org/index.php?article_id=22.

Activities of IUSS Divisions, Commissions and Working groups for IYS

For the International Year of Soils the IUSS Divisions and Commissions had decided to increasingly raise soil awareness. Each quarter contributions to the IYS website of IUSS were provided by a different division. Commissions of these divisions provided knowledge on special soil topics to inform about the importance and diversity of soil which can be downloaded here: http://www.iuss.org/index.php?article_id=23. Contributions from Working groups can be downloaded here: http://www.iuss.org/index.php?article_id=24.

Activities of National Soil Science Societies for IYS

The following reports are in addition to the activities reported in the IUSS Bulletin 127.

“Soil and Ecological Environment Safety — International Year of Soils (IYS) in China”

High-Level Forum held in Beijing

The year of 2015 has been acknowledged as the International Year of Soils (IYS) at the 68th UN General Assembly. To promote this global activity, a high-level strategic and decision-making orientated forum on “Soil and ecological environment safety — IYS in China”, was held from 11th to 12th July in the China Hall of Science and Technology, Beijing. The forum was sponsored by the Chinese Academy of Sciences, China Association for Science and Technology, Ministry of Agriculture and Ministry of Environmental Protection in collaboration with the Soil Science Society of China, Institute of Soil Science of the Chinese Academy of Sciences, Chinese Association of Agricultural Science Societies, and the Institute of Policy and Management of the Chinese Academy of Sciences. The forum was chaired by Fang Xin, deputy secretary of the Communist Party of China Leading Group of the Chinese Academy of Sciences. The executive vice president of Science and Technology, Mr. Shang Yong, and the China Coordinator of the UNEP and chairman of the UN commission on climate change and environmental projects, Mr. Zhang Shigang, spoke at the opening ceremony.

Fang emphasized the ecological relevance of soils in supporting the food safety and the development of agriculture, and its critical roles in water and energy conservation and in the protection of biological diversity as well as to the buffering of the climate change. The acknowledgement of the International Year of Soils on the 68th UN general assembly has evoked considerable public attention to the protection of soil resources. The Chinese
Government has been consistently making great efforts regarding the protection of soil resources. In May 2015, President Xi Jinping gave important instructions and emphasized strict rules are to be established to protect China’s farmland. The objective of this forum was to achieve public recognition of the importance of the soils.

In the morning session of July 11, 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 sciences, and Shen Renfang, president of Soil Science Society of China and general director of Institute of Soil Science, Chinese Academy of Sciences made plenary lectures on the issues of Soil Science for Eco-environment Protection, Soil management for Sustainable Agriculture; Soil Pollution Control, Strategies of National-wide Protection of Soil Resources, and Soil Safety. Officials and experts had extensive discussions during the high-level dialogue of the afternoon section.

The forum recognized the importance of soils and soil sciences in the development of national economy. It clarified the potential questions in soil safety and achieved bundles of strategic guidelines and instructions on soil protection. This forum is anticipated to start a new era of efficient protection of China’s soil resources and will also build up a healthy atmosphere for the construction of ‘Beautiful China’.

This forum has attracted broad attention of media including CCTV NEWS, People’s Daily online, Xinhua News and Ifeng News.

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, Acad-
emician 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.

70th Anniversary of Soil Science Society of China & Symposium of Inheritance and Development of Soil Science held in Chongqing, China

2015 was the International Year of Soils (IYS), as well as the 70th Anniversary of the Soil Science Society of China (SSSC). To respond to the IYS and World Soil Day, and to increase public awareness and understanding of the importance of soil for food security and ecosystem functions, the 70th Anniversary of SSSC & Symposium of Inheritance and Development of Soil Science was held from 4th to 6th December in Southwest University, Chongqing, China. More than 600 participants, including Prof. Qiguo Zhao and Prof. Zhaoliang Zhu, Academics from the Institute of Soil Science, Chinese Academy of Sciences, attended the Symposium.

The opening ceremony, held in the morning of 5th December, was presided by Prof. Feng Hu, vice president of SSSC. Prof. Renfang Shen, president of SSSC, Prof. Zhongmin Ding, vice president of Southwest University, and Mr. Minghui Ning, Crop Production Department officer at the Ministry of Agriculture of the People’s Republic of China, delivered their speeches. The launching ceremony of the science book titled “Silence Soil” was held at the end of the opening ceremony. Prof. Ganling Zhang, one of the...
authors, gave a brief introduction to the book. He said he hoped the book could help people to better understand, love and protect soil.

The 70th Anniversary of SSSC, presided by Prof. Xin Jiang, general secretary of SSSC, was held in the morning of 5th December. A documentary film, named “the Inheritance and Development of Soil Science in China” was shown to the attendees.

During the symposium, as many as 44 scientists gave their presentations, showing their most recent progress and achievements with different aspects of soil science. By the end of the Symposium, the 10th SSSC Award in Science and Technology (3 winners) and the 1st National Soil Judging Contest for College Students (7 group and 16 individual winners) were awarded by Prof. Jianmin Zhou, the honorary president of SSSC and Prof. Renfang Shen, respectively.

The official closing ceremony of the symposium was held on 6th December. During the ceremony, Prof. Renfang Shen said “we should be proud of the past achievement. However, we still have a duty for the future development of soil science in China, even the whole world”. He hoped that Chinese soil scientists would consider the 70th anniversary of SSSC as a new beginning, face the new challenge in soil science, and work hard for the inheritance and development of soil science in China.

**2015 International Year of Soils in Costa Rica**
*By Floria Bertsch, President of the Costa Rican Soil Science Society*

In Costa Rica, 2015 was a glorious year for soils! Never before did we talk and do so much in favour of SOILS as during the celebration of the International Year of Soils, and the best achievement was that the groups related to the subject, such as the ACCS-Asociación Costarricense de la Ciencia del Suelo (Soil Science Association of Costa Rica), y CA-DETI-Comisión Asesora Sobre Degradación de Tierras (Advisory Commission on Land Degradation – local representation of the UN Convention on Desertification) joined efforts towards the same objectives.

The main activities focused on:
- Harmonization of discourse among professionals,
- Influence on the political level on the national sustainable development agenda,
- Public awareness
- Reaching the heart of future generations.

**Harmonization of discourse between professionals**
Although soil scientists and agronomists do not need motivation to recognize the importance of soils, we felt it was important to convey a clear,
consistent and convincing message about the integral role soils have for the life on our planet.

1. The VIII Soil Science Congress saw the participation of 250 professionals, where the seven soil functions were presented by world-renowned specialists including Dr. Rainer Horn, Dr. Flavio Camargo, Dr. Diana Wall and Dr. Rattan Lal.

2. In partnership with the Association of Agronomists of Costa Rica we carried out five talks in all the regions of the country.


**Influence on the political level on the national sustainable development agenda**

We arranged a panel on “The land use in Costa Rica” to discuss the proper coexistence of the seven functions of soil.

The “San Jose Declaration” was signed by government officials and international soil representatives as witnesses, committing each from its scope, to defend the soil resource and to work continuously for its good management and preservation.

We have got from government authorities (MINAE-Ministry of Environment and Energy and MAG-Ministry of Agriculture and Livestock) the promise to formulate a joint ministerial directive to urge all institutions and users of soil resources to comply with national and international agreements and to consider the soil in all instances.

**Public awareness**

1. We have been present in various media: radio, television, newspapers.
2. Three giant banners were placed in relevant public buildings.
3. Professionals from Universities and ACCS incorporated the issue in their daily work by relying on external signs designed for the occasion.
4. Soil scientists contributed extensively to the Farmer’s Almanac 2016 called “Our Farm”, which is distributed by MAG to a large number of farmers every year.
5. A national lottery ticket was dedicated to the International Year of Soils.
6. The Costa Rica Mail Service produced a postmark that circulated for three days and an envelope was designed for this purpose.
7. A workshop called “Painting with Soils” was organized with a group of older adults.

**Reaching the heart of future generations**

1. A Photo Competition for young people was organized and two awards for the carrying out of technical tours were given to the winners by members of AACS in order to share with them some soils characteristics.
2. Classes on the use of a Digital Soil Map of Costa Rica were offered for students of a Vocational Technical College under the guidance of soil scientists.
3. Educational lectures on the role of soils in the hydrologic cycle and erosion and on the importance of composting to maintain the good health of soils, were given in three primary and rural schools with infographic material designed for this purpose.

Finally, the top activity of the year, coinciding with the celebration of the World Soil Day, will be realized on December 4th. We called it “Hands to the Soil” (simulating the Spanish expression “Manos a la Obra” or “Let’s do it”) and participants of the four main areas of activity, agricultural, political, public and children were invited to perform a soil conservation practice with their own hands on a square meter of farm soil.

As a corollary of this International Year of Soils, the Costa Rican Association of Soil Science will receive, by next December 11, a solemn event at the College of Agricultural Engineers of Costa Rica, the “Special Recognition 2015” for “the many activities organized in this International Year of Soils 2015 for the Costa Rican public awareness on the importance of soil resources for life”. We are convinced that after this year the Soil, as a resource, has begun to win the affection of many more Costa Ricans and, from now on, all conscious forces will work together to implement concrete actions to preserve our resources for future generations. We only care and protect what we love!

**Finnish Society of Soil Science – Celebrating IYS in Finland**

*By Helena Soinne, Finnish Society of Soil Sciences*

During the celebration of World Soil day on the 4th of December 2015, the Finnish Declaration of the International Year of Soils was handed over to the Minister of Agriculture and the Environment of Finland. The declaration was formulated together with representatives from Finnish Society of Soil Sciences, the University of Helsinki, the Natural Resources Institute Finland, Finnish Environment Institute, the Ministry of Agriculture and Forestry, and the Ministry of the Environment.
Healthy soil is the foundation of life

Healthy soil guarantees sustainable food production, pure environment and secure future. Soil is an unrenewable natural resource. It may take a thousand years for one centimetre of soil to be formed, but only a few seconds to destroy it. Yet, soil is easily forgotten and just left below the surface. The consequences of reckless land use may not be immediately evident – in most cases they appear only after some time, when rectifying the situation may be costly or even impossible. Soil that is seriously damaged by erosion or contaminated cannot produce high-quality food or secure access to pure drinking water.

In the Year of Soils we wish to draw attention to four functions of the soils that are vital for living organisms and the environment:

**Soil feeds fields and forests.** It is the foundation for vegetation that grows and is cultivated for human food, animal feed, fibre, fuel and medicines. Soil impacts on the quantity and quality of the food produced and it recycles the nutrients contained in dead plants and animals back to be used by other living organisms.

**Soil is the habitat for a diverse range of living organisms,** which represent a fourth of the total biological diversity of our planet. A spoonful of healthy soil contains more living organisms than there are people on the Earth. These living organisms are a measurable and partly yet unknown genetic reserve that can be utilised e.g. for developing new medicines.

**Soil is the skin of the Earth,** with a role to play in climate change mitigation and adaptation. It produces greenhouse gas emissions, mainly as a result of farming activities, and it is a key factor in the carbon cycle as it functions as an important carbon reservoir.

**Soil is a huge filter and storage element for water,** as it stores and filters water for the needs of plants and humans and protects against floods and drought. The status of our water bodies depends a great deal on nutrients and contaminants coming from the lands.

Soil must be duly taken into consideration in research and decision-making on the national, European and international levels. Enough teaching on soil-related matters needs to be provided already at schools. Caring for healthy and functioning soils and transferring these to future generations is a common mission for the whole humankind.

At the event celebrating the International Year of Soils on 4 December 2015

Ministry of the Environment
Ministry of Agriculture and Forestry
Finnish Environment Institute
Natural Resources Institute Finland
Geological Survey of Finland
Central Union of Agricultural Producers and Forest Owners MTK
Central Union of Swedish-speaking Agricultural Producers in Finland SLC
Metsähallitus

Finnish Forest Centre
Finnish Association for Nature Conservation
Finnish Society for Nature and Environment (Natur och Miljö r.f.)
WWF Finland
University of Helsinki
Åbo Akademi University
University of Turku
University of Jyväskylä
University of Eastern Finland

Aalto University
University of Oulu
Finnish Society of Soil Sciences
Finnish Peatland Society
Scientific Agricultural Society of Finland
Finnish Society of Forest Science
Geological Society of Finland
Finnish Association for Environmental Education
Association for Soil Research and Restoration

The English version of the Finnish Declaration of the International Year of Soils
Furthermore, a public seminar and a panel discussion was held at Think Corner, in Helsinki on 4 December 2015 (for details please see the meeting report in the respective section).

In addition, as a result of photo competition of the International Year of Soils, the Finnish Society of Soil Sciences published a wall calendar including the winning photos. The calendar was awarded to the Minister of Agriculture and the Environment of Finland during the celebration of World Soil Day and is available for everyone to purchase.

![Wall calendar showing the winning photos of a photo competition](image)

**Activities of the Italian Society of Soil Science (SISS) in 2015 to celebrate the IYS**

By Anna Benedetti & Carmelo Dazzi
(anna.benedetti@enteca.it; carmelo.dazzi@unipa.it)

The Italian Society of Soil Science (http://www.scienzadelsuolo.org/welcome_.php) was established in Florence, in 1952. Presently, it counts around 180 members distributed in 4 Divisions (Division 1 – Soil in Space and Time; Division 2 – Soil properties and processes; Division 3 – Soil Use and Management; Division 4 – The Role of Soils in Sustaining Society and the Environment).

In 2015, to celebrate the International Year of Soils, SISS carried out several activities. These, in chronological order, have been the following:

**Celebration of the International Year of Soils in Georgia: Olympiad for school children “Earth is our home”**

By Prof. Dr. Tengiz F. Urushadze, Director of the Mikheil Sabashvili Institute of Soil Science, Agrichemistry and Melioration, Agricultural University of Georgia

Since the UN had declared 2015 the International Year of Soils, the Mikheil Sabashvili Institute of Soil Science, Agrochemistry and Melioration of the Agricultural University of Georgia together with the Georgian Soil Science Society and the Association of Professional Chemists held the Republican Olympiad for schoolchildren “Earth is our Home”. The goal of the Olympiad was to increase publicity of natural sciences (especially soil science), to promote agricultural disciplines and understanding of their role, to increase acknowledgement of the need to care for a safe environment and ecology. The competition was held in two rounds. 95 pupils took part in the competition, of which 27 were selected by the jury for the next round. The final round of the competition was held at the Agricultural University, in which 15 pupils took part. From preliminarily prepared issues the contestants selected three on a lottery basis. The following issues were selected: Morphological signs of soil; Soil erosion and degradation; Soils of East Georgia – a brief description.

The task was fulfilled in two academic hours. The jury assessed the works and pupils were awarded I, II, III degree certificates. Their teachers were awarded certificates of gratitude.

First degree certificates were awarded to: Nini Dzamashvili (teacher - Ketevan Ediberidze) Zestaponi Revaz Mumladze Public School # 7; Nino Makasarashvili (teacher - Eliso Abramishvili) Sachkhere Ilia Chavchavadze Public School # 2; Anna Narindoshvili (teacher - Nino Bolkvadze) Rustavi Public School # 4; Mariam Tvauri (teacher- TamarBeridze) Gori region, vil. Lower Sobisi public school; Salome Lasareishvili (teacher - Nana Gigolashvili) Tbilisi public school# 94; Saba Chelidze (teacher - Maka Ortashvili) L. Devdariani Gardabani Public School #1; 8th grade. The Republican Olympiad for Schoolchildren will be held annually.
Seminar on healthy soil and soil fertility: role and function of micro-organisms
Rome, 6 March 2015
Jointly organized by the Italian Society of Soil Science, the CREA-Research Centre Plant and Soil System, and the Italian Association of Agronomists (Lazio Division). During the seminar, which was attended by 45 participants, the key role played by soil biodiversity in the conservation of soil fertility was discussed.

SISS summer school on “Soil Bioindicators and Biodiversity”
VII edition: “Soil biodiversity and food security” Rome, 4 and 5 June 2015
The VII edition of the SISS summer school on “Soil Bioindicators and Biodiversity” was jointly organized by the CREA-Research Centre Plant and Soil System and by SISS. This edition, in the international year of soils and EXPO exhibition, aimed at discussing with PhD students, stakeholders, researchers, agronomist association, etc., the role of soil biodiversity for food security (Fig. 1). The different threats on soil biodiversity and on soil fertility and food security were analyzed. The summer school was attended by more than 50 persons.

Conference on: “Soil Fertility and climatic change: the role of farmers”
EXPO- Milan (Italy) 20 June 2015
CIA – Italian Farmers Association (Fig. 1 to cel- ebrate the international soil year) invited, SISS Vice-President (Anna Benedetti) to hold a lecture on soil biodiversity conservation and SISS President (Carmelo Dazzi) to participate in a round table on the role of the Scientific Society in soil education for the Farmers Association and Farmers. The conference was hosted by the EU pavilion at EXPO.

Conference on: “Soil Quality and Plant Nutrition: Professional Aspects and Opportunities for Agronomists”
Milan (Italy) 17 July 2015.
Jointly organized by the IAA - International Asso- ciation of Agronomists (Fig. 2) and by SISS - Italian Society of Soil Science, the conference was hosted by the IAA pavilion at EXPO. It took into consideration the mission of the Agronomists who, dealing with the interactions among plants, soils, and the environment, play a fundamental role in land management and soil and water conservation.

RuralCAMP2015 “Sustainable use of soil: a priority issue addressed through rural development policy” Rome, 21 - 25 September 2015
RuralCAMP2015 is a summer school, a sort of rural training camp, organized in collaboration with CREA Research Institutes and farms, located in Tor Mancina (Roma). This summer school involved 35 students (16-18 years old) and 10 teachers from 13 vocational secondary schools selected at national level among the schools belonging to the National network of secondary vocational schools for agriculture (ReNisA).
The initiative comprised five days of field activities (thematic workshops, field visits, focus group, practice exercises and short meetings with experts/farmers).
Workshop on GLOBAL SOIL PARTNERSHIP: from theory to practice
30 September 2015 – EXPO, Milan, KIP Pavillon

The workshop aimed at illustrating the mission of the Global Soil Partnership for creating and promoting awareness of the soil resources in any social and cultural sphere. Some study cases will show the key role of correct land management for both maintaining the environmental balance and protecting the soil ecosystem services. Several students attended and actively participated in the workshop (Fig. 3).

Expo 2015 workshop

SOILS OF ITALY: genesis, distribution, classification and risks between current reality and future expectations
30 September 2015, EXPO, Milano, KIP Pavillon

The aim of this workshop was to illustrate the main features of the Italian soils, with an emphasis on their genesis, distribution, classification and threats faced by our priceless natural heritage. Eight invited speakers and a wide audience attended the workshop.

SISS exhibition booth at Expo 2015

Milan, 28 September-4 October 2015

“A Feeding the Planet, Energy for Life” was the leitmotiv of the six months Expo 2015 Exposition that was hosted in Milan from May to October 2015. The Italian Society for Soil Science aiming at directing the attention of the Expo visitors to the importance of the Soils for “feeding the Planet” and for “giving Energy for Life” organized a booth (Fig. 4) for one week. Books on soils, soil maps and gadgets on soils were distributed to the visitors that stopped asking for information.

Agricultural Biodiversity for Healthy Soils and People
Rome, FAO HQ, 16 November 2015

The SISS Vice-President held a lecture on Agricultural Biodiversity for Healthy Soils. The lecture stressed mainly that “improving soil biodiversity is vital to ensuring soil health and future food and nutrition security”.

Workshop Cost Action BioLink “Soil Biological Community and Aboveground Resilience”
Rome, 17-19 November 2015

To celebrate the IYS the Italian Focal Point and Vice-President of SISS were invited to describe the activities carried out by Italian Scientists concerning the Soil Global Partnership. The meeting built upon that network of research and personal relationships created by the BioLink community and explored the current state of knowledge of the connection between soil functions as mediated by soil biota and above ground ecosystem productivity.

40th National Congress of Italian Society of Soil Science & World Soil Day celebration
Rome, December 1-3, 2015

On 1-3 December 2015, the 40th National Congress of the Italian Society of Soil Science (SISS) was held in Rome, organized by CREA-RPS, (CREA-Research Center for the Soil-Plant System) and
by the University of Palermo. About 100 scientists from Italy attended the congress. The objective was to recognize the key role of the soil in the healthy food production, under the slogan “Healthy soil for Healthy Life”, the same slogan adopted by FAO for the IYS. Along with intensive scientific activities, the social life of the congress participants was rich in remarkable events. In particular the first day of the conference ended with a World Soil Celebration Party with nice cakes representing soil profiles (Fig. 5).

The last SISS initiative to celebrate the IYS was the first edition of a Photographic Contest on the issue “Healthy Soil for Healthy Life”. The winner was Antonello Bonfante from the Italian National Research Council.

Nigeria Celebrates the International Year of Soils

From the Newsletter of the Soils Science Society of Nigeria (SSSN), Vol. 25 No. 2

Activities marking the celebration of the International year of soils (IYS) in Nigeria were flagged off at the Multipurpose Hall of Landmark University, Omo – Aran, on March 10, 2015. In his address at the flag off ceremony, the president of Soil Science Society of Nigeria, Prof. V. O. Chude, charged all soil scientists to take good advantage of these two soil events to promote the importance of soil to our health, wellbeing and socioeconomic growth. He stressed that the International Year of Soils aims to be a platform for raising awareness of the importance of soils for food and nutrition security and essential eco-system functions all year round.

The objectives of the IYS are:

• to create full awareness of civil society and decision makers about the fundamental roles of soils for human’s life;
• to achieve full recognition of the prominent contributions of soils to food security, climate change adaptation and mitigation, essential eco-system services, poverty alleviation and sustainable development;
• to promote effective policies and actions for the sustainable management and protection of soil resources;
• to sensitize decision-makers about the need for robust investment in sustainable soil management activities aiming at healthy soils for different land users and population groups;
• to advocate rapid enhancement of capacities and systems for soil information collection and monitoring at the national level.

Highlights of the activities included the unveiling of the IYS logo, presentation of the special IYS T-shirt, display of soil monoliths and historical photographs of the activities of SSSN, as well as society publications, and a special session of the Fellows of SSSN.
The president of SSSN, Prof. V. O. Chude, specially charged the Fellows of the Soil Science Society of Nigeria to play leading roles in creating awareness about the soil in their various geopolitical zones. He informed that a memorandum of understanding (MoU) between the Food and Agriculture Organization (FAO) of the United Nations and SSSN will enable the Society to organise a one day training workshop on the Importance of Soils and their Utilization for youths in senior secondary schools and students of agriculture intertiary institutions in each of the six geopolitical zones.

A nationwide youth seminar (catch them young) on the importance of Sustainable Soil Management and Soil Science as part of the celebration of the International Year of Soils with financial support from FAO were held between 15th June and 30th June 2015 in the following institutions: Federal University of Technology Owerri (FUTO), University of Nigeria Nsukka, Moddibo Adama University Yola, Institute of Agricultural Research and Training (IAR&T) Ibadan, University of Calabar, Michael Okpara University of Agriculture, Umudike, Ahmadu Bello University, Zaria, and Nasarawa State University, Lafia.

In the course of the International Year of Soils 2015, numerous other meetings, seminars, workshops and conferences were organized in Nigeria, including a one-day seminar/workshop for south-south youths in commemoration of IYS held at Chunua Achebe Arts Theatre, University of Calabar, June 26, 2015; one-day seminar for the celebration of the IYS on the topic “Importance of Soils” in south-east Nigeria at Michael Okpara University of Agriculture Umudike (MOUAU), June 25, 2015: in the course of this workshop, the concept of ‘soil evangelization: for ecosystem conservation & food security’ was presented, which aims at raising awareness about soil security (importance of soil resources) and to address soil and land related challenges to sustainable development. Another memorable event was the 2nd annual soil science students’ national convention held March 19, 2015, by the Department of Soil Science and Land Resources Management, Obafemi Awolowo University, Ile-Ife. Another event was a one-day IYS seminar at the Department of Soil Science and Technology, Federal University of Technology, Owerri (Futo), June 23, 2015.
39th Annual Conference of the Soil Science Society of Nigeria held at the Landmark University, Omu-Aran, Kwara State, March 9-13, 2015.

The theme of the conference was Managing Nigerian Soils for Food and Nutrition Security, Climate Change Adaptation and Mitigation. Over five hundred soil scientists, environmentalists, farmers, policy makers, the organised private sector and students attended the Conference. Participants discussed current soil-related challenges with particular emphasis on the management of the nation’s soils for food and nutrition security, climate change adaptation and mitigation.

Resolutions:
Given that the soil holds great potentials for resolving many of the World’s economic and food production problems, and in consonance with the various programmes enunciated for marking the 2015 International Year of Soils (IYS 2015) as declared by the United Nations, the Soil Science Society of Nigeria hereby resolves as follows:

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

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

40th Annual Conference of the Soil Science Society of Nigeria (Calabar 2016)

The 40th Annual Conference of the Soil Science Society of Nigeria took place 14-18 March, 2016. The theme was: Promoting use of Nigeria’s Soil Resources for Sustainable Ecosystem Services, Climate-Smart Agriculture, Food and Nutrition Security.

International Year of Soils 2015 in Poland

By Piotr Hulisz

During the International Year of Soils 2015, members of the Polish Society of Soil Science organized more than 50 scientific and educational events such as conferences, seminars, exhibitions, lectures and practical classes for schoolchildren and teachers, and workshops for staff of various institutions. In addition, a few popular science papers
were published. These initiatives were carried out at local, regional and national level. They were designed to draw attention to the fact that good soil is essential for global food production and provides a number of important environmental functions.

The biggest national event associated with the celebration of the International Year of Soils 2015 was the 29th Congress of the Polish Society of Soil Science “Soil resources and sustainable development” (http://www.org.up.wroc.pl/igosr/PTG29/index_a.html), which was held in Wroclaw between August 31 and September 5, 2015. During the meeting, more than 200 participants from Poland and abroad presented and discussed their results on the genesis, properties and classification of soils, as well as the rational use and protection of soil resources.

Other important supra-regional activities were educational projects realized in Soil Education Centre - Soil Museum (Agricultural University in Cracow; http://www.muzeumgleb.pl/), as well as the establishment of the Polish National Soil Platform (Institute of Soil Science and Plant Cultivation in Pulawy), which brings together academics, officials from different levels of Polish government, and farmers.

International Year of Soils: SSSA’s Year in Review

By David Lindbo, Susan Fisk and Susan Chapman

In April 2013, the Food and Agriculture Organization of the United Nations (FAO) member countries endorsed the request from the Kingdom of Thailand to create the International Year of Soils with the stated goal of raising awareness on the importance of sustainable soil management as the basis for food systems, fuel and fiber production, essential ecosystem functions, and better adaptation to climate change for present and future generations.

With this announcement, SSSA leaders gathered during the 2013 Annual Meeting to discuss opportunities for SSSA’s role and possible public awareness campaigns around soils’ issues. We knew there was great potential!

An SSSA task force was formed, led by David Lindbo, to oversee the communications campaign. Leaders were gathered from academia, government, and industry and represented key groups such as the UN, the National Academies, and IUSS. As a first step, the key audiences of members (for outreach) and K-12 educators were defined. In tandem, the
objective for these audiences was clarified: providing them with reproducible activities that would have a life span beyond IYS 2015.

Then, the team developed 12 monthly themes, and a monthly leader was recruited to oversee the efforts for that month. Each monthly leader (some using teams) and staff developed:

Activities for K-12 educators to use in the classroom, Activities members could use in any location, Two Soils Matter blog posts, One two-minute IYS video script, narrated and cartooned by Jim Toomey (see below), A monthly email newsletter for educators, Overview of the theme (developed by SSSA member Meghan Sindelar), News releases, Periodic special IYS News Flash e-newsletters, and Social media postings. Please find a few selected examples below.

Jim Toomey created 12 two-minute videos based on the monthly themes. Humor, graphics, and a quick pace help explain complex topics such as carbon sequestration and cleaning/capturing water. The videos are posted on https://www.soils.org/IYS and on the SSSA YouTube channel.

Another example of SSSA’s outreach activities is the colouring and activity book designed for younger readers.

Designed for the younger audience, the coloring book and activities demonstrate the themes of each month and are designed to get kids thinking about soil. Teachers and parents can use this to talk about soil and how it is important to kids, families, and the world!

In a nutshell, SSSA was very active with celebrations and activities during the 2015 International Year of Soils. And, we were thrilled to be recognized with a prestigious award for our project: The SSSA International Year of Soils year-long event was awarded the American Society of Association Executives 2016 Gold Circle Award in the Media/Public Relations/Advocacy category. This competition signifies excellence, innovation, and achievement in association/nonprofit marketing, membership, and communications programs. A full report of our 2015 year-long activities was written for our member magazine, CSA news.

For the full report, the reader is kindly referred to: https://dl.sciencesocieties.org/publications/csa/articles/61/2/22
IYS Conference and Meeting reports

International University Meeting of Soil Sciences “Present and future functions of soils” celebrating the International Year of Soils, Campus UNAM –Juriquilla, Querétaro, Mexico, October 5-10, 2015

By Norma Eugenia García Calderón /México and Winfried E.H. Blum/Austria

The conference was held in Spanish and was organized by the Multidisciplinary Unit of Teaching and Research at the Faculty of Sciences and the Centre of Geosciences on the campus UNAM-Juriquilla, Querétaro, Mexico by Norma E. García Calderón and Gilberto Hernández Silva, in cooperation with Elizabeth Fuentes, Sara Solís, Soledad Medina Malagón, and Abel Ibañez, supported by colleagues from other Mexican universities. From 5-7 October the conference was dedicated to the “2nd International Seminar on Indicators of Soil Quality” and the “9th International Course of Soil Classification” - Amongst other topics lectures on “Pedodiversity “, “Soil Classification Systems”, “Ecological Functions of Soils” and “Soils and Global Change” were held. The 2 days of lectures, exposition of posters and discussions were concluded with a round-table on “Future Challenges in Teaching Soil Science”. A special highlight of these 3 days was the participation of many students and young scientists from all over Mexico.

From 8-10 October an excursion with the theme “Landsceapes and Soils in the Southern Part of the Sierra Gorda de Querétaro, Mexico” was organized and guided by Gilberto Hernández Silva in collaboration with Abel Ibañez Huerta, Norma E. García Calderón, Elizabeth Fuentes Romero, Sara Solís Valdez and Teresa S. Medina Malagón, see photo below.

The conference was attended by about 180-200 participants from Mexico, Austria, Cuba, Russia and the USA.

The next event celebrating the “International Decade of Soils 2015-2024” will be the “10th International Seminar on Soil Classification” from October 10 -14 and a “Workshop on Carthography & Digital Soil Mapping” from October 17-24, 2016 which will take place on the Campus UNAM-Juriquilla, Querétaro, Mexico.

Contact for information: fre@ciencias.unam.mx

Participants of the excursion “Landscapes and Soils in the Southern part of the Sierra Gorda de Querétaro, Mexico”. 
The meeting “Ecology of Soil Microorganisms” with a subtitle “Microbes as Important Drivers of Soil Processes” was held in Tophotel Praha, Czech Republic on November 29-December 3. In total, 401 persons registered for the meeting. The scientific programme was composed of 2 keynote lectures, 25 invited lectures, 62 contributed talks and 267 posters. This was the second meeting based on the idea that a specialized soil microbiology conference was missing. The aim was to provide an interdisciplinary platform where experts from different disciplines related to microbial ecology can meet and new strategies for further research topics can emerge from such interaction. The conference demonstrated the power of the novel tools used in microbial ecology including, among many others, metagenomics or metaproteomics, but at the same time it was apparent that the new approaches can only deliver important knowledge when combined with classical studies on individual microbes, in-situ chemical and biochemical analyses or ecosystem integration and modelling. A major goal of the conference - to bring into contact researchers in mycology and the large community of microbial ecologists that focus on bacteria and archaea was achieved and mycology topics were very well represented. This is crucial for the further development of soil microbial ecology, since without an understanding of the whole complexity of microbial communities, it is impossible to answer questions about ecosystem functioning. The meeting was designed to reflect not only the fundamental questions of soil microbiology but also to specifically address major current issues: the functioning of agricultural soils under different management strategies, the role of forest soils in the global biogeochemical cycles and the global human-induced effects on soils and their microbiota. Especially the sessions on global change effects, agricultural soils and microbial processes in the environment attracted much attention. The participants were generally positive about the meeting and it seems that the tradition of conferences on the same topic will be continued.
by the 3rd meeting to be held in 2017 in Helsinki, Finland.

With the help of the financial contribution from the International Union of Soil Sciences, the organisers were able to waive the conference fee of four early stage researchers that presented their work at the conference, in a total sum of 1560 EUR dedicated to Tommaso Bardelli (Italy), Katya Litova (Bulgaria); Ganga varapu Subrahmanyam (India) and Afnan Suleiman (The Netherlands).

Società Italiana della Scienza del Suolo (Italian Society of Soil Science)
40th National Congress, Celebration of the IYS and World Soil Day

By Loredana Canfora – CRA- RPS, Rome (Italy) – loredana.canfora@entecra.it and Giuseppe Lo Papa - University of Palermo (Italy) – giuseppe.lopapa@unipa.it

The 40th National Congress of the Italian Society of Soil Science (SISS), organized by CREA- RPS, (CREA- Research Center for the Soil-Plant System) and the University of Palermo was held in Rome, December 1-3, 2015. About 100 scientists from Italy attended the congress. The objective was to recognize the key role of the soil in the production of healthy food, under the slogan “Healthy soil for Healthy Life” the same slogan adopted by FAO for the IYS.

During the Opening Ceremony three distinguished invited delegates delivered their speeches, in representation of scientific and governmental institutions: Sally Bunning (Senior Land Management and Soil Conservation Officer, FAO), Parviz Koohafkan (President of the World Heritage Agriculture Foundation) and Ian D. Hollingsworth from Australia (HESSE).

The congress was supported by international and national scientific societies, associations and research institutes: International Union of Soil Sciences-IUSS, Associazione Italiana Società Scientifiche Agrarie-AISSA, Società Italiana di Chimica Agraria-SICA, Società Italiana Pedologia-SIPE, Società Italiana di Microbiologia Agraria, Ambientale e Alimentare-SIMTREA, Società Italiana di Agronomia-SIA, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria-CREA, Università degli Studi di Palermo-UNIPA, EXPO2015.

The main themes and subjects that were presented and discussed by 3 invited speakers, 24 oral presentations, 40 posters are summarized in this
The outstanding results of the congress were discussed during the banquets and the closing ceremony. In addition, most of congress participants attended or were involved in two further events:

- celebration of the World Soil Day 2015 and the closure of the International Year of Soils 2015, organized at FAO Rome Offices, on 4th December 2015, under the slogan “Soils: a solid ground for life”.
- celebration of the closure of International Year of Soils 2015, 5th December 2015 in Rome, an exhibition organized by AISSA (Associazione Italiana Società Scientifiche Agrarie). Main goals of the exhibition were: i) to raise soil awareness in the society involving children in open laboratories, holding seminars and open discussions; ii) to communicate that our soils are threatened because of land use, management practices, pollution, climate change; iii) to promote the sustainable use of soil resources that can ensure food quality.

Small public seminar held in Helsinki, Finland, 4 December 2015
By Helena Soinne, Finnish Society of Soil Sciences

The Finnish Society of Soil Sciences organized a public one-hour seminar and panel discussion at Think Corner, in Helsinki. Think Corner is a meeting place for research, the public and society located in the heart of Helsinki. The programme was built around the key messages of the IYS and aimed to increase public awareness of soils as well as topi-
cal soil research conducted at the University of Helsinki. Later on the same day, a Declaration of the International Year of Soils was handed over to the Minister of Agriculture and the Environment of Finland. The declaration has been formulated together with representatives from the University of Helsinki, the Natural Resources Institute Finland, Finnish Environment Institute, Ministry of Agriculture and Forestry, and Ministry of the Environment.

Soil message: **Healthy soil is the foundation of life.**

**Celebrating of the World Year of Soils and World Soil Day in Iran**

*By Dr. Farhad Khormali, Professor of Pedology at Gorgan University of Agricultural Sciences and Natural Resources and SSSI board member*

The World Year of Soil was celebrated at Gorgan University of Agricultural Sciences and Natural Resources (GUASUR), Gorgan, Iran with the collaboration of the Iranian Soil Science Society on 18 December 2015. Students of the Soil Science Department, Soil related officials from different organizations, soil science pioneers in Golestan Province and the university academic staff were present at the meeting.

The detailed program of the meeting was as follows:

1. As a Board member of the Soil Science Society of Iran (SSSI), my speech was on introducing the term Soil Security and its importance mainly by addressing the keynote speeches at the 20th World Congress of soil science in South Korea. Then I announced the initiation of the Golestan province branch of the SSSI. This branch has five board members from university and soil related organizations. The Golestan branch of SSSI would try to promote society's understanding of the soil and how to treat soil in a sustainable manner as its first goal. Besides the main board, the student branch of the SSSI was also initiated at GUASUR.

2. Dr Ali Najafinejad, president of the university gave his speech on the importance of soil and announced the establishment of the Soil Museum at the university during World Soil Day 2016. I was assigned to do this job. The soil monoliths from all around the province and from the whole country would be collected. Golestan province is well known for its unique Mollisols. Alfisols, Inceptisols, Aridisols and Entisols are other soils orders present in Golestan.

3. Hujjat al-Islam Namvar, talked about the importance of soil conservation as emphasized in the holy Koran.

*Dr. Farhad Khormali, Professor and SSSI board member*
4. Dr Ghorban Ali Roshani, the head of Cotton Research Institute of Iran, gave his speech on the need for a soil law. He emphasized the urgent need for the law on the protection and sustainable use of the soils.

5. Traditional music was performed by a former soil science graduate of GUASNR.

6. Soil Pioneers including the emeritus Professors and Soil Engineers were officially appreciated.

7. Students were highly motivated to participate in the election performed to form the Student Branch of the SSSI in Golestan. PhD, MSC, and BSc students were nominated and five were elected. They will play a main role to introduce the importance of soil to other students.

8. Finally, a soil contest was performed. On the stage, three student groups, each consisting of a BSc, MSc, and PhD, were asked some general applied questions on different aspects of soil and finally the winners were rewarded.


Fondation OCP and INRA Morocco in partnership with the FAO, 18-19 December 2015, Palmeraie Golf Palace, Marrakech

By: José Luis Rubio, Centro de Investigaciones sobre Desertiﬁcacin- CIDE; (CSIC, Universitat de Valencia, Generalitat Valenciana), Valencia, Spain. E-mail: jose.l.rubio@uv.es

The first International Conference on Afro-Mediterranean Soils: Constraints and Potentialities (and last international conference closing the International Year of Soils) has been a revealing and stimulating experience. The Conference held in Marrakech 18-19 December 2015 included most important issues related to soil and soil uses with a pan-African perspective providing an excellent update on the most important prob-
lems related to intrinsic African soil constraints but also a very enriching overview of promising approaches for adequate soil/land management. Soil information and modelling, soil carbon sequestration, soil fertility and crop management, soil restoration and soil health, agro-ecosystem services and climate change were some of the topics addressed. The presentations and the discussions showed an alive soil science community dedicated to provide scientific and applied knowledge for the challenges and opportunities of today’s transition scenarios. The Conference also shows the commitments and willingness to contribute to ameliorating social and economic difficulties, many of them related to problems of climate change. In this context, the organization of UNFCCC COP22 in Marrakech next year deserves thoughtful analysis and planning.

The Conference was opened by Pr. Mohamed Badraoui, Director of INRA Morocco, Mr. Amine Mourir Alaoui Executive Vice-President of Foundation OCP and Mr. Michael George Hage, the Representative of FAO in Morocco. Mr. Yosr Tazzi was acting as moderator throughout the whole Conference.

The Conference was organized in seven Scientific Sessions with keynote presentations and Workshops with oral and poster presentations. The first session focussed on Carbon management & sequestration and Climate-Smart Agriculture. The Keynotes speakers were: Rattan Lal, Ohio State University (OSU), with a video presentation on Soil Carbon Sequestration and Management to Mitigate Climate Change; Rainer Baritz of FAO, Rome, with Carbon Soil Information under Climate Change; Rachid Mrabet of INRA, Morocco, with Conservation agriculture (CA) as a climate-smart approach for coercing sustainability in the Mediterranean basin and Joseph G. Mureithi of KALRO-ACT/Kenya with Enhancing access to conservation agriculture Knowledge & Information and Partnerships: Experiences of the African Conservation Tillage Network (ACT).

The second Session was dedicated to Soil erosion and conservation measures. It included a keynote presentation by José Luis Rubio of ESBN, ESSC, WASWAC and CIDE-CSIC, Valencia, Spain on Challenges and opportunities for soil conservation under climate change scenarios.

The third Session was on Soil information and modelling, with two keynote presentations: Rachid Moussadek of INRA-Morocco on Soil Information System in Africa and NENA: an opportunity for improving soil management and climate change adaptation and Erik Braudeau of Texas A&M University, USA, with A new paradigm in soil science allowing for modelling the ‘green water’ dynamics in soil.

The fourth Session was on Soil in Africa: Quality and land degradation monitoring, with three keynote presentations as follows: Mamadou Traore of the African Soil Science Society, University Polytechnique de Bobo Dioulasso, Burkina Fasso, with Soil resources in Africa; Baghdad Bouamer of IAV Hassam Il- Marocco with Soil decontamination and Imad eldine Babiker of Agricultura/ Research Corporation (ARC), Khartoum, Sudan, with Climate smart vertisols soils and water management in rainfed dry lands farming.

Session five was on Soil Fertility management and crop fertilization, with two keynote presentations: Bouabid Rachid of Soil Fertility Map Project Consortium, ENA-Meknes-Morocco, with Fertilmap: a web-based soil information system for the management of soil fertility and crop productivity in Morocco and Tasse Hezekiel of the Ethiopian Agricultural Transformation Agency-Ethiopia who gave a presentation on the Ethiopia soil fertility project.

The seventh Session was dedicated to Conclusions, recommendations and closing declaration. In the final part of this report it is included the text of the Recommendations that emerged from the Conference.

The following is an interesting overview of the Conference elaborated by Rainer Baritz, FAO Rome, which highlights some relevant outputs.

Underlining the Conference

165 participants from 18 countries met in Marrakesh to discuss the very critical condition of soils, especially in Africa. The final communiqué highlights the crucial role soils play for the social and economic security of 40-80 % of the African people being dependent on mostly small-scale agriculture. While the growth rate of the world population averages 34 % world-wide, it reaches up to 120% in some African areas. At the same time yields are dropping by an average of -8 %, reaching alarming extremes of up to -40 % in some areas. At the same time, more than 50 % of the land area is degraded, due to water and wind erosion, but also nutrient losses, salinization and soil organic matter losses on agricultural land are important causes as
well. Even if these conditions were not considered, the majority of African soils would be difficult to manage due to its natural conditions: low nutrient storage capacity and low nutrient levels. Most of sub-Saharan Africa has naturally acid soils. Soil organic matter, the most important mediator to supply nutrients to crop roots, often has naturally low concentrations.

The conference revealed alarming facts about the condition of soils in Africa, high pressures from land use and hazards such as erosion and soil organic matter loss.

Only 8% of the African land area is suitable for agriculture, probably with a potential to increase if degraded lands were restored. However, reliable data about soil degradation, soil fertility and its potential improvement through sustainable soil management are lacking. There is also a lack of knowledge about the carbon sequestration potential of African soils: sufficient organic matter levels in soils are crucial for their functioning, and eventually help improving the resilience of farmers to climate change. Conference participants exchanged various technical reasons for this dramatic situation, but also solutions.

For example, various inventories and scientific studies are being conducted to explore current yield gaps (i.e., the mismatch between potential and actual yields). Farmers are lacking reliable advice and new knowledge considering the diversity of soil and local management conditions. Some of the main reasons are the absence of planning instruments and knowledge exchange, but also insufficient technical equipment. Reliable data and advice from laboratories - taken for granted in many developed countries – is lacking in many African countries, even if the sampling and analysis is sponsored or co-financed by government programs.

Reliable and updated information about soils and its sustainable management is not available. At the same time, soil institutions in research, government as well as higher education suffer from personnel reductions and lack of funding. However, very promising large-scale soil programmes are conducted with the specific purpose of closing the yield gap through wide-spread conservation agriculture and decision support for efficient fertilization. In Morocco, the Fertimap project covers 6.8 Mio ha cropland with some 26,000 soil samples taken. The results will be made available through a web-based soil information system offering decision support to farmers. Similarly, in Ethiopia, EthioSIS covers almost the entire country with some 53,000 sampling points. 6,000 extension specialists ensure that the information collected is reaching out and supporting the farmers. The experiences collected through these soil programmes demonstrate the magnitude of effort necessary to successfully guide and support farmers.

Soils can only be sustainably managed and restored if sufficient data reveal insights into the soil condition and its reactive potential for improving the nutritional status.

South-south cooperation is seen as an important means to utilize existing resources available and to transfer knowledge and capacity to areas where it is still lacking. Also, the regional soil partnerships for North Africa and the Near East as well as for Sub-Saharan Africa, which are regional bodies of the Global Soil Partnership, can be good means to intensify cooperation within the African region but also with the global community of soil experts from government institutions, research and education. The African Soil Science Society also founded regional networks in order to better address and advise on the challenges regarding sustainable soil management and soil restoration. One of the urgent needs for information is about the current state of soils. It is not well known where soil degradation and its restoration offers new opportunities for agriculture, and to which degree soils strongly exposed to hazards such as erosion and nutrient loss must be protected. Landscape and agricultural management planning need to consider the sustainable use of soils. However, reliable and high-resolution soil data are mostly lacking.

The report about the Status of the World Soil Resources, launched at the 2015 World Soil Day at FAO Headquarters in Rome, has especially looked at regional issues. The lack of basic information about soils and the threats endangering them, especially in the African continent, is alarming.

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Morocco will be hosting the 22nd Conference of the Parties (COP) of the UN Frame Convention on Climate Change (UNFCCC) at Marrakech from November 8th to 18th, 2016.

Recently, the international community has begun to discuss agriculture and climate change, especially in the context of adaptation and mitigation. The importance of small-holder farmers for regional food security, and the risk from climate change, are aspects addressed in the discussion. At this point, no clear strategy has been found to address agricultural issues, including soils, during UNFCCC negotiations. During COP21 in Paris, soils and sustainable soil management have received attention through the 4per1000 initiative, which was also included in the Lima-Paris Action Agenda. The next COP will be on the African continent, in Marrakesh. For the alarming situation of Africa’s most endangered natural resources – water and soils – this will be a challenge and opportunity to halt the continued degradation of these resources, to improve information about its condition, and to manage it sustainably.

Finally follow the Recommendations that emerged from the Conference that was preliminarily elaborated by an ad-hoc group under the leadership of the President of the Scientific Committee of the Conference Rachid Mrabet who presented the text to the participants of the Conference at the final Plenary Session for discussion and approval.

**Recommendations**

In response to the declaration by the U.N. of 2015 as the International Year of Soils (2015-IYS), OCP Foundation, INRA and FAO were pleased to have organized this international conference on Afro-Mediterranean soils and by the high quality contributions from national and international institutions and associations. The conference considered the challenges of soil degradation in participating countries and its impacts on food security for future generations.

The conference was an ultimate space of important exchange of experiences and a platform for knowledge and lessons sharing and brokering. The invitation and presence of high-level experts in various sciences and domains of soils from eighteen countries have given to the conference a large scale and magnitude for developing new ideas and opportunities for further sustainable development in Africa and the Mediterranean basin.

The participation of a high percentage of young researchers and students (with gender balance) guarantees the future involvement of research to sustainability of soils.

The conference itemized the crucial roles of soils in social, environmental and economic as well as food security challenges for the future wellbeing of African societies.

The conference highlighted the urgent need to deepen the south-south cooperation and enrich the exchange and sharing of technologies, resources, experiences and knowledge.

The debate and profound discussion during workshops helped participants to get acquainted with important traits of soils, crops, pastures and forestry including global warming. Several management systems were addressed and science-based options were discussed in order to regenerate soil fertility and revitalize the environment.

The importance of soils in policy and decision-making was also reviewed and the need for strong information systems, reinforcement of capacity building of all stakeholders (universities, research institutions, private laboratories, extensions services etc.) and to foster soil protection legislation and policies was recognized.

The conference recognizes the importance and the implication of the COP-22 to be organized by the government of Morocco in November 2016 and recommends the creation of a task force or an advisory group to prepare a road map to COP-22 for issues related to the priorities and challenges affecting African soils and climate change.

The conference proposes to get further inspiration from Global Soil Partner (GSP) initiative through the implementation of World Soil Charter that addresses soil degradation, competition for resources, effects on soil productivity, environment and economy.

The scientists and academics assembled at the conference concluded that the soil research status in Africa should be ameliorated further through raising the volume of research and the incorporation of new innovative tools and integrative solutions for soil restoration and improvement and to upgrade scientific/research platforms while using state of the art innovations, equipment and methods (i.e. isotopic techniques for soil erosion and water productivity studies, precision techniques, monitoring tools, soil information and mapping technologies etc.).
Sparse soil information in Africa requires carrying out an extensive soil survey and digital mapping allowing better management of lands thus satisfying the increasingly diverse expectations of Afro-Mediterranean societies from soils.

Fostering soil carbon sequestration and management in agricultural, pastoral and forested lands is vital for combatting and mitigating climate change and providing needed agro-ecological goods and services. Prof. Rattan Lal stated that “With a great success, as exemplified by the “4 pour mille” proposal at COP-21, it is important that the International Union of Soil Sciences (IUSS) and national societies celebrate the “Decade of the Soil” from 2015 to 2024».

Integrated nutrient management, conservation agriculture and soil/water conservation need additional consideration. Research centers should use their synergies in order to improve soil research and scientific infrastructures. In this regards, the 3 organizing institutions commit themselves to follow up on the recommendations and organize more conferences and support projects on soils. These recommendations will be shared with all participants and their institutions.

Selected photos from the first International Conference on Afro-Mediterranean Soils: Constraints and Potentialities:
Other IYS activities

IYS event at the University of Delaware: DENIN event to boost appreciation for soil, an overlooked resource

The Delaware Environmental Institute (DENIN) hosted an event in celebration of the International Year of Soils on Monday, Dec. 7, in the Trabant University Center. The University of Delaware community was invited to stop by DENIN's booth near the food court to play soil-related trivia, enter the “Pay Dirt” raffle, pot a plant to take home, and sample the special “DENIN Dirt” ice cream flavor concocted by the UDairy Creamery.

Read more: http://www.udel.edu/udaily/2016/dec/denin-soil-120215.html

Launch of the report: Status of the World’s Soil Resources

The Status of the World’s Soil Resources produced by FAO’s Intergovernmental Technical Panel on Soils has been launched during the World Soil Day celebration and closure ceremony of the International Year of Soils

Read more: http://www.fao.org/documents/card/en/c/c6814873-efc3-41db-b7d3-2081a10ede50/

Wrapping up the International Year of Soils - FAO

The 6 key messages to take away from IYS2015

In 2015 we celebrated the “International Year of Soils” and with good reason. Soil sustains all our agricultural and livestock food production, wood for fuel production, filters water so that we can drink it and fish can live in it. We also use it for construction - therefore it sustains our homes and infrastructure.

Here are the six essentials to take away:

International Decade of Soils (2015-2024)

In the course of the highly successful conference Celebration of International Year of Soils 2015 – Achievements and Future Challenges, 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.

In the ‘Vienna Soil Declaration’ of Dec. 7, 2015, the IUSS has identified the key roles played by soils in addressing the major resource, environmental, health and social problems which humanity is currently facing. Given this situation, the IUSS believes that it is incumbent on IUSS members to not only maintain the level of activity generated in IYS 2015 but to increase the momentum and the extent of our contributions on these issues as we move towards the Centenary of the IUSS formation in 2024.

The Executive Committee and the Council of the IUSS will play a pivotal role in setting overall objectives and directions during this period. However, it is essential that all Divisions, Commissions, Working Groups, National, Regional and individual Members accept the challenge to undertake activities to ensure that the significance of soils in maintaining healthy life and environment remain continually at the forefront of political and scientific planning and decision making.

The International Decade of Soils shall thus be a continuation of the efforts made during the International Year of the Soils 2015. It will be marked by a number of activities on the national and international levels.

IUSS plans to play a key role in education, dissemination of information, issuing informative press statement on key issues, co-ordinating activities across the world through our National Members (e.g. World Soils Day) and maintaining a historical record and collecting personal biographies.

Recent achievements

As a first step, a logo was designed:

![International Decade of Soils 2015-2024](image)

The basic concept of the logo design describes a healthy soil profile. The logo is made up of ten lines - each representing one year in the international decade of soils. Each line also represents a decade of IUSS, leading up to the organisation’s centenary in 2024. The brown of the soil horizons in the logo is darker towards the top and gradually becomes lighter further down, demonstrating a soil organic matter content declining with depth. A green plant sprouts out of the soil - demonstrating soil as the origin of life itself. Earthworms symbolize the vitality of soil life, weaving the letters IUSS into the healthy soil.

Secondly, the Vienna Soil Declaration was translated into Spanish and Portuguese. Its key messages will be used for dissemination purposes. Furthermore, a new version of the Soil Globe showing the IDS logo was produced, which will be distributed by IUSS presidents at several events. And, last but not least, upon the initiative of the Latin American Society for Soil Science (SLCS) the first outreach campaign via social media was launched in which the global soil science community is invited to participate. In the framework of a project called ¡Thrus are Soils of my Nation! a ‘Soil’s Friends Virtual Network’ will be created to generate public awareness of the need to preserve soil.

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Planned future activities

**Public outreach**: It is important to show the emotional and cultural relevance of soils to reach the general public and other target groups. Partnerships will be forged with other international organisations (e.g. IAEA, CGIAR, UNEP, Worldbank, WWF, Friends of the Earth, …) who could help propagate IDS messages and support us in our endeavours. Furthermore, interested media (National Geographic, Discover, …) will help us to reach the general public and companies who share the same values, as well as others who wish to propagate IUSS IDS messages through their own channels by becoming “soil ambassadors”; all working together with potential sponsors, who would benefit from publicly showing their interest in protecting soil etc.

**Education**: The main focus of our activities should be on school age children (who will be teenagers and young adults in 10 years’ time). Some young children’s books already exist; we could assist with their translation into other languages. Web-based material needs to be developed (together with teachers notes) that would target several age groups (including adults). When this material has been developed it could again be translated into other languages. Another idea put forward was to create a soil jigsaw which would allow every person doing the jigsaw to make their own world of soils.

**Dissemination of information**: The IUSS will act as an independent, reliable source of information about soils and their role in key areas affecting humanity, such as: food production, food security, climate change, carbon sequestration, nuclear contamination, etc. It is important that we communicate regularly and directly with the general public on these and many other issues.

**Soil book series**: Following the very successful publication of Soil Matters- solutions under foot\(^4\), a series of books on new and upcoming topics is planned. The next book in this series will be on urban soils and shall be published by the end of 2016.

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\(^4\) Edited by Stephen Nortcliff on behalf of the IUSS, Nov. 2015, Catena Verlag, GeoEcology Essays. 160 pages, ISBN 978-3-923381-63-0. Orders can be placed at iuss@umweltbundesamt.at

**Personal biographies**: IUSS has prepared documents to guide the collection of personal biographies through a series of interviews or personal statements and plans to run trials over the next few months using an initial template. Following this initial period the process will be refined based on the feedback from interviewers and the project will be disseminated more widely through international contacts and National Member Societies. Based on these interviews it will be possible to publish a collection of Personal Biographies for the Centenary celebrations.
Report of the 7th International Conference of Africa Soil Science Society (ASSS)

By Mamadou TRAORÉ, Martin YEMEFACK, Michel SEDOGO

The 7th International Conference of Africa Soil Science Society on “Critical soil solutions for sustainable development in Africa” was held from 29th of May to 5th of June 2016 at Ouagadougou, Burkina Faso. Attended by more than 300 participants from 18 countries (Africa, America, Europe and Asia), the opening ceremony of the conference was under the patronage of the Minister of High Education, Research and Innovation, by the Minister of Agriculture and Hydraulic Infrastructure and the Secretary General of the Minister of Environment, Green Economy and Climate Change of Burkina Faso.

The conference included oral and poster presentations, held from 30th of May to 2nd of June 2016. It was attended by more than 300 participants including experts in soil science, students, farmers, NGOs and policy makers. The different presentations addressed the current and future challenges of soil science in Africa, in accordance with the objectives of sustainable development, especially the goals 2, 13 and 15; and the Nairobi Declaration on the African Process for combating climate change. The following sub-themes were discussed:

1. primordial solutions for sustainable land management in Africa;
2. platform for big data on Integrated Soil Fertility Management in support of agricultural transformation in Africa;
3. research conducted on fertilizer recommendations in Africa
4. Global Partnership and African soil;
5. Soil productivity in tropical agro-systems;
6. African Soil Landscapes and Soil Genesis,

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Figure 1. Opening ceremony of the 7th International Conference of Africa Soil Science Society (from right to left: Minister of High Education, Research and Innovation, the Minister of Agriculture and Water Facilities, chair of the Scientific Committee).
• Soil conservation and restoration of soil productivity;
• Soil Climate and Climate Change;
• Knowledge, education and capacity building in Soil Science.

Since the partnership is a key area of the ASSS, the conference was also an opportunity for the participants to be informed about the activities of the Global Soil Partnership (GSP) worldwide and for Africa on the regional level. The ASSS committed to support the implementation of the related action plan.

Another side event of the Conference was the launching of the French version of the Soil Atlas of Africa. Indeed, the Soil Atlas of Africa is the result of a multi-stakeholder partnership (ASSS, FAO, ISRIC, IUSS, etc.), coordinated by the Joint Research

Figure 2. Opening ceremony of the of the 7th International Conference of the Africa Soil Science Society (Public participating in the opening ceremony).

Figure 3. Poster presentation at the 7th International Conference of the Africa Soil Science Society.
Centre (European Joint Research Centre) of the European Commission and ASSS. In addition to launching the French version of Soil Atlas of Africa, the book “Nature & Fauna Volume 30, Number 1” on sustainable land management: key to food security and nutrition in Africa was presented. This book was published on the occasion of the celebration of the International Year of Soil 2015.

The first phase of the conference ended with a business meeting where the Executive bureau of the Africa Soil Science Society was renewed. Therefore, the new Executive Bureau of the ASSS for the period 2016 - 2018 is as follows: Dr Mama-dou Traore, Burkina Faso (President); Zimbabwe (Vice-President); Dr Cargele Masso, Burundi (Secretary General); Pr Paul Tematia, Cameroon (Deputy Secretary General); Mme Gisèle Tapsoba, Burkina Faso (Treasurer); Vice Treasurer (vacant); Atanga Igue, Benin (auditor), Auditor (Tanzania); Dr Martin Yemefack, Cameroon (Past President); Dr André Bationo, IFDC (godfather).

The second phase of the conference (2-5 June 2016), was a tour from Ouagadougou, Burkina Faso to Kakun National Park, Ghana. Soil series in relation to their use and the effect of climate change were observed along this transect. In total 6 soil profiles, in different agro-ecological zones and under different types of utilization have been described. 50 specialists in soil science (Burkina Faso, Cameroon, USA, Ghana and Benin) and 10 soil science students took part in this transect tour.

In conclusion, the participants recognize that it is essential to recognize the key role of soils and soil science, in the achievement of food security and the provision of eco-system services essential to sustain the development of Africa. This is fundamental for sustainable production and adaptation to climate change and climate variability.

In this context the ASSS and its members are committed to:
1. accelerate collection and promotion of proven best and context adapted practices that could help stop or reverse land degradation; reduce risks related to climate variability; increase resilience of agriculture and communities to address climate change; and promote integrated practices that minimize inputs and promote other benefits such as carbon sequestration.
2. encourage members of the ASSS and other stakeholders (national and/or regional institutions) to be more involved in the production, enhancement and dissemination of soil quality data necessary to support actions and decision making especially in land transactions for various uses.
3. promote the availability and accessibility of inputs and amendments.
4. contribute to integration in the development of national policies and development plans, the concepts of integrated soil fertility management, amendment and soil quality conservation.

5. explore possibilities for promoting the principles of conservation agriculture with regard to its success in some areas as one of the best approach of conservation and management of natural resources.
Global Pioneers in Soil Conservation: Common Elements and Lessons Learned

Edited by J. Dumanski, D. C. Reicosky, and R. A. Pieretti


This Special Issue of the Journal for Soil and Water Conservation Research is dedicated to those pioneers in soil conservation, farmers, researchers and extensionists, who questioned tradition and implemented new theories and new technologies in soil conservation. These pioneers recognized the often devastating impacts of agricultural land and soil degradation, and their observations of the impacts of intensive tillage and soil erosion led them to try new technologies such as zero till, no-till, direct seeding, stubble and residue mulching, and various other conservation tillage practices. Their successes are significant, because through these approaches, the pioneers laid the ecological foundation on which a more sustainable agriculture could be developed.

The papers in this issue include success stories from various regions including North and South America, Australia, Europe, and China. The papers are put in context with an international overview paper on global soil conservation (Kassam, et al., 2014, this issue). While we recognize that there are other “No-Tillage pioneers” deserving recognition for their risk-taking, innovation and contributions, we do not attempt to provide complete, comprehensive coverage.

Healthy soils are fundamental to support all forms of terrestrial life on the planet, and they are the foundation for a sustainable agriculture and for a sustainable future. However, land degradation, including in particular soil erosion, organic matter loss, soil nutrient loss, and soil compaction, has increased severely as agriculture has moved from low input, high labor, small holder systems, to modern, large, highly mechanized, low labor systems. On these modern farms, the use of large, heavy, and often high horsepower machines, travelling at speeds higher than necessary, often mask concerns on conserving the quality of the soil on which production and environmental services depend. This is most prevalent in developed country agriculture, but the trends are similar in many developing countries. The principles that ecologically underpin sustainable soil and production management, as described in the papers in this issue, are potentially applicable to large or small farms, rich or poor farmers, tropical or non-tropical agro-ecologies (Jat, et al., 2014).

Efforts to control land degradation and soil erosion can be traced over millennia. Although some local successes have been achieved, on a global level results have not been significant. Montgomery, (2007a) explains the impacts of poor soil management on civilizations that have arisen and then vanished. Many once thriving civilizations eventually collapsed due to, amongst other things, soil erosion, salinization, nutrient depletion and other types of land degradation. Are we any different? In modern history, land and soil degradation has continued unabated, in fact, it has increased severely over the past century, sometimes to the point that it has threatened the continuation of agriculture in countries most susceptible. This may appear alarmist, but the evidence is there.

Mechanical tillage, leading to destruction of soil life, loss of soil organic matter and soil structure,
along with reduced water infiltration and soil moisture holding capacity, is recognized as one of the most significant root causes of soil degradation and erosion. The damage to the soil system caused by mechanical tillage cannot be put right by simply adding more agrochemicals and pesticides, and even more mechanical soil disturbance. So, what to do? Recently, some significant successes have been achieved, and perhaps we should look here first and follow the examples of the successful pioneers. This is the purpose of this Special Issue. In this, we have brought together for the first time, the evidence of how this is happening and where. Also, we honor those pioneers, farmers, researchers, and extensionists, whose work, dedication, and innovation have made this possible. Their stories must be preserved before it is too late; we have much to learn from these forward thinking people.

In most cases, the original pioneers were individual farmers who observed tillage-induced erosion on their farms and questioned and challenged traditional agricultural practices, in particular the need for soil cultivation (inversion tillage) prior to seeding. In their minds, it was better to do it the way nature intended. The no-tillage pioneers were keen observers of the resources of their farms. Their creativity and innovation led them to the conclusion that there must be a better way to manage their soils for greater productivity and resilience. These farmers, with close support from dedicated researchers and extensionists, devised solutions to replace these soil and landscape degrading practices. The solutions were radical for their time (and still are to some), and the practitioners were often ridiculed by their peers and by some scientists, but they stuck to their convictions, and over time these pioneers demonstrated what was possible with the new approaches.

So what did they do right, and what can we learn from them? Why, after millennia of past efforts in soil conservation, which at best were only marginally successful, these pioneering efforts are much more so? What are the common elements? What are the lessons learned? What more do we need to know?

This Special Issue reports on these success stories at the country level. Each story is unique; each pioneer(s) began his efforts for personal reasons. In the early years, their efforts were local and individual, but as the interest spread and more farmers came on board, they formed farmer-led local and national farmer associations, cooperatives and clubs to promote the philosophies and concepts based on working together and leaning by doing. These progressive farmers, doing some of their own on-farm research, shared their lessons and experience with fellow farmers with similar interests. Much of the success is attributed to this farmer to farmer communication and sharing of information and experimental knowledge. Eventually these local associations (clubs) coalesced into national and international associations, and progressed to a global movement for Conservation Agriculture.

The papers illustrate and reinforce the value and coincident knowledge gained when combining analogue observations of farmers with relevant scientific studies. In fact, it is in this combination of farmer-scientist collaboration that the biggest gains have been made.

Definitions and Concepts

Each paper in the Special Issue reports the technologies that are used in their countries in terms common to them. Therefore, there are terms such as zero-till, no-till, conservation tillage, Conservation Agriculture, and so forth. Originally, it was thought that perhaps these terms should be standardized, but then this may cause some local confusion. In the final version, the terms were left as they are used in their respective countries.

Effectively, all these terms fall under the umbrella of the FAO definition of Conservation Agriculture (Friedrich et al., 2012). This is based on three interlinked principles of: minimising or avoiding mechanical soil disturbance (no-till seeding), maintaining a continuous soil cover of organic mulch, and cropping system diversification. The latter involves sequences and rotations of annuals, perennials and cover crops, all aimed to improve and sustain a healthy soil capable of responding optimally to modern crop, nutrient, water, pest and energy management practices. The concept also includes precision and controlled traffic farming.

There is no universal recipe, formulae or prescription for Conservation Agriculture, nor should there be. However, the three interlinked core principles are potentially applicable to most land based rainfed and irrigated production systems, including an-
nual and perennial cropping, horticulture, plantation, agroforestry, and crop-livestock systems. In all cases, these principles are implemented based on locally formulated and locally adapted practices to address local biophysical and socioeconomic constraints and locally relevant multiple farming goals. At the same time, there are no short cuts; the aim is to eventually reach the point where all three principles become complementary and where the synergy gained can assure success. Collectively, the practices contribute to enhancing soil quality, soil health, and soil resilience. They become the ecological foundation for sustainable production intensification and the continued flow of ecosystem services. The concept of Conservation Agriculture is increasingly being accepted throughout the world.

Common Elements and Lessons Learned
Conservation Agriculture is still a phenomenon of North and South America and Australia/New Zealand, but increasingly it is being adopted in many other regions including Asia, Africa and Europe. Currently, just less than 10% of global arable cropland is under Conservation Agriculture, but in those countries where it has been most actively promoted, coverage is often more than 50% of cultivated area. In these countries, agricultural production is normally higher than ever, environmental impacts are much reduced, and production is on a more solid, sustainable base.

From the collective experiences described in the papers, there are a number of common elements from which much can be learned:

Observation, motivation, innovation, risk taking: This is one of the most important common elements among the success stories. Each pioneer farmer (and/or researcher or extensionist) had conviction and motivation beyond the ordinary to resolve their problems, whether this was to control catastrophic erosion (tropics), optimize profits through reduced costs and labor (temperate regions), capture the opportunities for expanded markets, or whatever. Their capacity to observe, rationalize, take risks, manage, and innovate to ameliorate early failures, and to try new approaches, were instrumental in their success. To initiate the no-till system required a deep conviction and belief that one is going to make the production system better than before.

The importance of research and innovation: In all cases, problem-solving research was the “spring board” on which progress was made. In their search for solutions, the farmers took advantage of information available from research plots and field trials. Some long-term research trials showed that under no-till systems, erosion rates could be reduced to be almost equivalent to rates of soil formation (Montgomery, 2007b). Also, the importance of soil health, diversity and resilience, as invoked through cover crops, soil biology, crop diversity, and soil available water, was established. These are critical components of sustainable agricultural systems.

Importance of farmer associations. The formation of local and regional farmer associations was the common driver to promote and expand adoption of the local systems to national and international levels. These associations, which promoted farmer to farmer demonstration and learning, instilled confidence and support to overcome traditional biases, and provided inspiration and guidance to others to try the systems. They served to encourage and empower farmers to take charge and resolve their soil and landscape management problems without waiting for others. Although innovations of individual farmers are significant, it is the farmer network that gives it strength and credence. The willingness of innovative farmers to share their lessons and experience with other farmers contributed enormously to the acceptance of no-tillage agriculture systems.

Knowledge based system: Conservation Agriculture is more knowledge and management intensive than conventional tillage agriculture. To a large extent, it requires soil management according to ecological principles rather than by conventional, universal, intrusive prescription. These include promoting healthy soil biology, increased soil organic carbon, improved aeration and soil water and nutrient use efficiency, while concomitantly enhancing farm profitability and sustainability and the flow of ecosystem services. Success depends on managing the ecology of the systems to enhance environmental quality, while optimizing economic returns. This is the biggest challenge.

Drought proofing, climate change, and producing in difficult environments. Studies on the impact of Conservation Agriculture confirm the improvement in soil organic carbon, improved soil water
holding capacity, improved soil biology, and improved soil health and resilience, all contributing to minimizing input use and optimizing (rather than maximizing) factor productivity. The papers in this issue (and others) show that the extra soil moisture and the improved soil health achieved under Conservation Agriculture can often assure at least some minimal yield during times of difficult droughts or producing in difficult environments. This is increasingly important, as the growing evidence of climate change points to ever increasing extremes of weather and variability of weather events. The soil functional improvements impart a degree of drought proofing on farms with Conservation Agriculture, and some degree of amelioration to climate change. They also expand the horizon of production to areas normally considered to be beyond the present day arable margin. Due to lower fuel use and greater carbon sequestration, Conservation Agriculture has been shown to contribute to reducing Green House Gas emissions and global climate change.

**Impacts of perverse policies and programs.** The story of farmer innovation in Conservation Agriculture is a complex interplay of policy, economics, science, farming and mind-sets. The system of government sponsored farm support policies and programs, particularly the commodity support and the income support programs, have acted to maintain conventional tillage agricultural technologies, in deference to adoption and promotion of modern soil and landscape conservation and management. Those countries with the highest subsidy programs tend to be those with the lowest rates of conservation adoption. In the face of this, farmers often take the initiative and adopt Conservation Agriculture simply because they find it to be more in sync with their conservation ethic than conventional agriculture. One of the major challenges of modern agriculture is how to sustainably intensifying production while maintaining productivity, profitability, and ecosystem services, in the face of uncertain terms of trade and fluctuating commodity markets. Protecting and preserving a healthy soil and landscape, the fundamental foundation of food and agricultural production, is the first step along the way.

**Conclusion**

The papers demonstrate Conservation Agriculture as a practical, agro-ecological, approach to achieving sustainable agriculture intensification. This success in sustainable production started with a few risk tolerant and innovative pioneers, but over time it evolved to offer environmental, economic and social advantages, as well as improved productivity, improved ecosystem services, and improved soil resilience. Also, it has been shown to have application in all agro-environments. In some cases, currently in the tropics and subtropics, it has become the foundation for a productive and sustainable agricultural industry. These remarkable achievements are testaments to the development and promotion of farmer innovation, and the sustained investment in agricultural research. This would not have happened without the pioneering work of these farmers, researchers and extensionists who questioned tradition and implemented new theories and new technologies in soil conservation.


**Acknowledgements.**

It takes a team to take the material provided by the authors and put it into a final edition containing these papers. We are grateful to the team assembled by Prof. Li Rui for doing this, including Mr. Zhang Tan and others of the Team in Beijing. In addition, we sincerely and gratefully acknowledge the valuable assistance, patience, and editorial contributions of Dr. John Laflen, USA, in preparing the manuscripts for publication.
Favourite Soil Science Books of Gergely Tóth

By Gergely Tóth, European Commission, Joint Research Centre

Proceedings of the First International Conference in Agrogeology. Royal Hungarian Geological Institute, Budapest, 1909
Original title: Comptes Rendus de la Première Conférence Internationale Agrogéologique
Institute Géologique du Royaume De Hongrie, Budapest 1909.

Inspiring and relaxing

This book teaches me many aspects of soil science. But not only that. With stories from the early days of its independent life it also teaches how to think about soil science.
Each part of it is a treasure. Large shares of the discussion minutes could have been noted down in a recent meeting, while each scientific paper opens up and tries to solve issues of current relevance. For example a system-based evaluation of weathering processes including characterization by climate types (Treitz) is something that todays’ soilcritzone studies try to pick up. The paper on site specific management with a mention of the importance to prepare soil maps for its support (Leplace) presents a topic that has even increasing significance. The ‘Unification of methods of chemical soil analysis’ (Hilgard) is another masterpiece from which we can learn not only the early development of soil analytical methods, the hows, but also the whys.

This book is inspiring for me: Like all authors try to put their theme into a wider context, I should also try to think about soils not only in their inherent complexity, but in their relationship to other compartments of nature and culture as well.

This book makes for a very relaxing reading too: It assures us, soils scientists, that we are not late for anything. The greatest minds of the last century left behind quite some bits of well-known issues, which were first raised in 1909, to be resolved. We, the unworthy posteriors can also spend our lives on these issues.


Informative and entertaining

Sometimes I used to think about how to make soil science attractive to anybody interested in the secrets of the living planet. Now I do not need to think further, here is a book that does it. This book is the favorite of my kids too, but I do not feel ashamed to admit that I learned a great deal from it myself as well.

Soil Science I-II. Agricultural Publishing House, Beijing 1983
Original title: Turanxue (shang/xia ban) turannon-gyehua zhuanye yong. Beijing 1983

Well balanced and enlightening. This two-volume textbook was written for university students with a specialization in soil science and agrochemistry (as its subtitle explicitly says). Therefore it aims at comprehensiveness, which is elegantly achieved.
The first volume lays down the basics (mineralogy, organic matter, ion exchange, chemical reactions, porosity and structure, soil water, soil air, thermal characteristics, nutrients) and then goes on to issues such as contamination and land management.
The second volume is dedicated to soil genesis, classification and the introduction and systematic characterization of soil types of China and the world with discussion of their main utilization alternatives.
The above components are ideal for the formation (print) of this book. The handwritten notes and comments – in my copy – originate from the second distinct phase of its genesis: the time when I attended the university course which this book supports. The increasingly shabby look is the result of the maturing phase in the book’s development: the post-course cultivation. The latest changes are the ultimate reason for keeping a special place for this book on my bookshelf.

Three great Soil Science books presented by the Soil Science Society of America

By Susan Chapman, SSSA

SOIL! Get the Inside Scoop
https://portal.sciencesocieties.org/Purchase/ProductDetail.aspx?Product_code=9f56c88f-76f0-dc11-b6b8-0013210e308c
...because along with the Dig It! this book launched an era of outreach efforts to spread the word about soils to the public.

Know Soil, Know Life
https://dl.sciencesocieties.org/publications/books/tocs/acesspublicatt/knowsoilknowlif
because this is an accessible textbook about soil for students of many ages (high school through adults) and from many perspectives (i.e., from ecology students to gardeners) to learn soil science.

Methods of Soil Analysis series
https://dl.sciencesocieties.org/publications/methods-soils
because these books have been standard lab shelf references for decades and continue to be loved. Methods will continue to be published in the digital area as updates and new methods are needed and developed.

Favourite Soil Science book of Stephen Nortcliff

By Stephen Nortcliff, University of Reading

Earth Matters: How soil underlies civilisation.

Richard Bardgett published this excellent short book in 2016, the year following the celebration of the International Year of Soils, and in it he continues many of the important themes developed during 2015. The soil is often taken for granted and often treated poorly as if it had little or no value; it is referred to by many as ‘dirt’ and we have the derogatory term ‘treating something like dirt’ which reflects how there is a general lack of awareness of the importance of soils in many aspects of our lives. Bardgett seeks successfully to illustrate how important soil is to our lives and highlight why we must take every opportunity to nurture the soil and prevent its damage.

There are seven chapters covering widely different aspects of soil and soil science. Each chapter illustrates a number of ways in which we can view soils. The reader is not ‘overpowered’ by reference to large amounts of scientific literature, the reference to scientific literature and notes on topics are well used to provide context for the reader. With exception of a short final chapter the rest are of similar length, between 19 and 28 pages. The first chapter deals with soils in the distant past using a sequence of soils from the coast inland in Queensland to illustrate the development of soils through time; from contemporary soil development to soil development which began half a million years ago. This chapter also introduces the often complex relationships between soils and the environment in the context of the soil forming equation. Chapter 2 focuses on Soils and Biodiversity. This is now widely recognised as a topic of great importance. The chapter focuses on the tremendous biological diversity within the soil and the complex interactions which take place therein which affect so many aspects of our life. The common association of many with the soil is as a medium for plant growth, and this is the theme of Chapter 3. Whilst so much of our food is grown on our soils we have a long record of abusing our soils by mismanagement. Bardgett highlights some of the misuse but
he is not pessimistic for the future, showing a number of examples where, through our scientific understanding of the soil system we are developing more sustainable agricultural practices.

Soils in urban environments are addressed in Chapter 4 where the author stresses that although there is a great deal of soil sealing with concrete and asphalt, much soil is present in cities in gardens, allotments and open spaces. Whilst in the past many of these soils where contaminated and poorly cared for we have become much more aware of their importance and there is widespread action to remediate contaminated soils and develop practices which nurture our urban soils. Chapter 5 addresses Soil and War. The early part of the chapter deals with the problems encountered by infantry and machinery through saturated soils and the attendant mud, highlighting the numerous problems encountered in the war of 1914-18, but also more recent problems in Afghanistan. War throughout the 20th Century often included high explosive shells and aerial bombs and these have a marked impact on the soil surface, a process described by Bardgett as 'bombturbation'. In the Vietnam War defoliants, principally Agent Orange, were used widely. These persisted in the soil and have had long term impacts on populations living on these lands. Other aspects of warfare are discussed such as the environmental contamination resulting from the use of depleted uranium ammunition and radioactive contamination from nuclear weapons. Chapter 6 focuses on Soils and Climate Change. If written in the 20th Century this would probably have been a very short chapter, but in recent years soils have been recognised as a very significant carbon pool and offering the potential with good soil management for medium to long term carbon sequestration. Soils also emit CO₂ because they are a biologically active medium and there are cases where carbon emissions are increasing with climate change, but careful management can reduce these emissions and with other practices the soil can be a key carbon sink. Looking at soils in the future in Chapter 7 Bardgett picks up on the themes presented earlier in this book. Because of our increased awareness of the many roles played by soils in numerous aspects of our lives we are in a stronger position to take action to prevent further degradation and to improve the quality of our soils. There is increasing National and International recognition of the importance of soils as a key part of the global environmental system.

In conclusion this is an excellent, concise and very well written text which should be read by as wide a readership as possible, not just Soil Scientists. Soil Scientists will find this text interesting, non-Soil Scientist will find it fascinating!
Soil Health Institute launched to benefit soil
The Samuel Roberts Noble Foundation, in partnership with the Farm Foundation, announced the launch of the Soil Health Institute, a private-public partnership that works directly with farmers, researchers, academia, legislators, government regulators, industry, and environmental groups to improve soil health. The Institute will focus on five specific areas: research, standards and measurement, economics, education/communication and public policy.

Large scale soil restoration for climate change adaptation, mitigation and food security – what’s in it for smallholder farmers?
Hosts: Institute for Advanced Sustainability Studies (IASS), Institute for Sustainable Development and International Relations (IDDRI)
In recent years, land restoration has gained increased attention in the international climate regime because of its potential role in mitigating climate change. Moreover, there is increasing recognition of the adaptation needs in global agriculture. Many of the pledged Intended Nationally Determined Contributions (INDCs) reflect this recognition.

Soil data may improve assessments of wildfire risk
Wildfire is known to have a dramatic impact on soil, but do soil conditions also affect wildfire? A new study says yes, and the finding could lead to better predictions of wildfire danger. The open access paper, which appears in the November–December 2015 issue of Soil Science Society of America Journal, addressed a simple but understudied question, says Oklahoma State University (OSU) soil scientist and lead author, Erik Krueger: Is soil moisture related to wildfire? When the scientists crunched the numbers, they found that 91% of Oklahoma’s largest fires during the growing season broke out only when soil moisture dropped below levels that cause plants severe stress.

On World Soil Day, scientists warn of underground extinction risks
It’s time for ecologists and conservation biologists to dig deeper into dirt – in order to better understand the threats facing soil creatures that are key to healthy ecosystems and our food supply, and that might offer a rich source of potential antibiotics. That call to expand studies of oft-neglected underground biodiversity is included in a new collection of papers timed to highlight World Soil Day, which was celebrated on Dec. 4. “Despite marked progress over the last few decades, currently soil ecology still lags far behind aboveground ecology, and our knowledge of the world belowground is comparatively limited,” soil ecologist Stavros Vereouglof the Free University of Berlin.
Puzzling polar desert carbon probed in Canadian study

On Ellesmere Island high in the Canadian Arctic sits the Dome: a rocky, polar desert mountain that Steven Siciliano thought would make a great reference site for studies of greenhouse gas (GHG) fluxes from soil. To the University of Saskatchewan soil scientist, the Dome’s sparse vegetation signaled a dearth of soil organic matter and microbial activity. And because of this, he hypothesized, GHG emissions would also be negligible compared with those in Arctic soils blanketed by mosses and willows. However, he was wrong.


Study suggests eroded sediments could be phosphorus sink rather than source

For decades, phosphorus pollution has contributed to unwanted algae blooms in many lakes—including Vermont’s Lake Champlain. A raft of recent research has pointed a finger at eroding streambanks, suggesting their washed-out soils are a major source of this phosphorus flow. But a new study in the Journal of Environmental Quality complicates that picture, raising questions about whether streambank erosion is in fact a culprit in Lake Champlain’s phosphorus problems. The new research shows that while eroding streambanks may increase the total amount of phosphorus that ends up in the lake, some of these soils may also decrease the amount of phosphorus available to algae.


Free access article collection on World Soil Day celebrations from Taylor&Francis

To celebrate World Soil Day 2015, Taylor&Francis have put together a free access article collection from various relevant journals and the public can view and download this set of articles for free. The link to this campaign can be found here: http://explore.tandfonline.com/content/est/world-soil-day-2015

Soils are the Foundation for Vegetation which is cultivated or managed for feed, fibre, fuel and medicinal products

Healthy soils are crucial for ensuring the continued growth of natural and managed vegetation, providing feed, fibre, fuel, medicinal products and other ecosystem services such as climate regulation and oxygen production. Soils and vegetation have a reciprocal relationship. Fertile soil encourages plant growth by providing plants with nutrients, acting as a water holding tank, and serving as the substrate to which plants anchor their roots. In return, vegetation, tree cover and forests prevent soil degradation and desertification by stabilizing the soil, maintaining water and nutrient cycling, and reducing water and wind erosion. As global economic growth and demographic shifts increase the demand for vegetation, animal feed and vegetation by products such as wood, soils are put under tremendous pressure and their risk of degradation increases greatly. Managing vegetation sustainably—whether in forests, pastures or grasslands—will boost its benefits, including timber, fodder and food, in a way meets society’s needs while conserving and maintaining the soil for the benefit of present and future generations.

Also available in: Italian, French, Russian, Spanish, Arabic, Chinese (Simplified) http://www.fao.org/documents/card/en/c/dd-7761ba-8255-46a7-8bca-7dca1cbe6092/

4 per 1000 - Soil Carbon to Mitigate Climate Change

In this article Andrea Koch, Alex McBratney and Budiman Minasny investigate the viability of a call by the French Government in the lead up to COP21 to increase carbon in the global soil stock by 4 per cent per annum, based on Australia’s world leading regulatory approach to carbon farming.


Tough action on carbon offers a bright future - Nicholas Stern argues the economic benefits of tackling emissions

In an article published on 27 November 2015 in the Financial Times the author put forward that regarding land use, we not only had to stop deforestation, but had to move to reforestation and rehabilitation of our soils, thereby removing carbon dioxide from the atmosphere. He furthermore suggests that the UN climate change summit in Paris
should be a turning point for the low-carbon transition of world’s economy.
Source: FT, Section Managing Climate Change, November 27, 2015

**Iowa’s Climate-Change Wisdom**
In this NY Times article the author, Jeff Biggers, describes energy related initiatives in Iowa pointing out the important role of soils in climate change mitigation.
Source: NY Times, November 20, 2015

**Agricultural policy: Govern our soils**
Luca Montanarella published an article in NATURE with the title “Agricultural policy: Govern our soils”. In this article, he calls for a voluntary international agreement to protect soil from erosion and degradation through a reinvigorated Global Soil Partnership (GSP). The GSP is the best current option for driving forward various recommendations, despite its shortcomings. The partnership needs to motivate all invested parties to develop commitments to specific actions. These should enshrine soil management in legislation tailored to each country’s needs. The GSP needs to prove that it can be more than just a talking shop, and can generate political will and raise funding. The FAO has suggested an initial budget of $64 million over five years for the GSP, mainly to help to develop a Global Soil Information System and to promote training and capacity building in developing countries.

**The Dirt on Dirt: 5 Things You Should Know About Soil**
World Soil Day: why our life depends on it. We walk on it every day. Get it under our fingernails. Track it into the house. But do we really appreciate the vital role soil plays—not just in the environment, but in human health?
The United Nations Food and Agriculture Organization is giving soil its due. Friday, December 5, is World Soil Day, and 2015, the FAO has declared, will be the International Year of Soils.
“The minerals, the nutrients that make up our muscles and bones almost entirely come from soil,” says Jerry Glover, a National Geographic Emerging Explorer and agroecologist at the U.S. Agency for International Development.
“This is, of course, very critical because we’re supposed to be increasing agricultural production to feed and nourish some of the ten billion people, but it’s at the same time that our soils are the thinnest and most nutrient depleted.”
Here are five things you should know about soil:

**Living in the Soil Comic**
By: José Luis Rubio, Centro de Investigaciones sobre Desertificación-CIDE, Valencia, Spain.
A snail, a worm and a group of young people are some of the characters who star in ‘Living in the Soil,’ a comic produced in the context of ‘The International Year of Soils’ that aims to raise awareness about the most significant environmental and social issues related to soil and its need for protection. Through some 60 sketches, the authors report various aspects of the characteristics, functions and implications related to the use of this non-renewable resource. It reflects both the view of humans and the living organisms that inhabit soil. The comic, which is conceived as an educational resource, is aimed both at children and the general public and for students at all educational levels.

**Films about the soil**
[http://www.soilassociation.org/soilfilm](http://www.soilassociation.org/soilfilm)

**From potato to planet**
Did you know in one teaspoon of soil there are more living things than there are people in the world?
The Soil Association have worked with Aardman (the people behind Wallace & Gromit) to produce a short film about the benefits of taking little steps to protect our soils.
The film has been launched at the World Soils Day, a day aimed to connect people with soils and raise awareness on their critical importance in our lives. 
https://www.youtube.com/watch?v=Fd871cZzGI4

Soil Story
Watch it and see how the soil can help restore the carbon balance on earth.
https://www.youtube.com/watch?v=08TI1RKj54g
&feature=share
Read more: http://thesoilstory.com/

Between Earth and Sky
Between Earth and Sky released its second film trailer on Earth Day, April 22, 2016 after the first trailer won Golden ADDY. The ground-breaking film is the first of its kind to explore global climate change through the lens of soil science. The research-based film tells the story of global climate change by shining a light on arctic soils and ecosystems, and the livelihood of Alaskan-Americans. Between Earth and Sky is a collaborative film effort between the Soil Science Society of America, University of Alaska-Fairbanks (UAF), Texas Tech University (TTU), BL Allen Endowment in Pedology in the Department of Plant and Soil Science at TTU, Texas Tech Public Media, and USDA Natural Resources Conservation Service. The film documents the research of recently retired UAF professor Dr. Chien-Lu Ping, TTU’s Department of Plant and Soil Sciences Chair of Pedology Dr. David C. Weindorf, and numerous other scientists and Alaskans. The science-based film examines global climate change through the lens of Alaska’s changing landscape and people. The essence is that soil science is going to be at the center of the debate in climate change studies.
Read more: http://www.betweenearthandsky-movie.com (page down to find the video or search YouTube).

Sustainable Land Management in Africa
Did You Know 20-25% of all land on Earth is degraded? Sustainable Land Management practices help to ensure Soil fertility and lasting ecosystem services (food production, water filtration, etc). Solutions to SLM, especially in many countries in the Global South, need to be found through participatory dialogue with land users in varying contexts.
Read more: https://www.facebook.com/329677227185341/videos/612167398936321/?fref=nf

Thomson Reuters 2015 Highly Cited Researchers
The IUSS Secretariat congratulates Prof. Rattan Lal, IUSS President Elect, on his being named a Thomson Reuters Highly Cited Researcher and included in the 2015 list of the Most Influential Scientific Minds. The complete 2015 list is available at: http://highlycited.com/?utm_term=jan&utm_content=hcr-congrats&utm_campaign=12772-HCR_WMISM-27815&utm_medium=email&utm_source=Eloqua

How soils keep us healthy
Soils are one of the most complex and dynamic natural systems studied by scientists. Although usually out of sight, everything in our lives is underpinned by them — our roads, our homes, the food we eat, and the water we drink. It makes sense to reflect on their importance, particularly as 2015 was the International Year of Soil. However, not very many people are aware of the ways in which they keep us healthy.
Read more: http://www.hutton.ac.uk/research/themes/safeguarding-natural-capital/soilshutton/international-year-soils-series-articles/how-soils-keep-us-healthy

A Worm’s Eye View of Climate Change
Any gardener and producer know that worms are good for the soil. Vermicompost is reckoned by serious growers to be the crème de la crème of organic compost. But for coffee farmers in Central America, worms are also an unlikely ally in the fight against climate change.
Read more: http://www.huffingtonpost.co.uk/marike-de-peaa/climate-change_b_8758754.html

Soils will lead the next green revolution – if we allow them
The “green revolution” led to an increase in crop yield at least three times greater than the previous century, and this increase was primarily a result of the introduction of fertilisers, pesticides, and new crop varieties. However, while most crop yields are no longer increasing, the world population is still growing. The FAO estimates the global population will reach almost 10 billion in 2050.
Read more: http://www.hutton.ac.uk/research/themes/safeguarding-natural-capital/soilshutton/international-year-soils-series-articles/soils-green-revolution
**FAO Infographics: Soil An essential ingredient to healthy food and nutrition**

Our soils are by nature linked to the micronutrient content of our food production. The poster shows how to reverse the increasing trend of nutrient depleted soil by adopting sustainable soil management practices.


**Soils store and filter water - Improving food security and our resilience to floods and droughts**

Functional soils play a key role in the supply of clean water and resilience to floods and droughts. Water infiltration through soil traps pollutants and prevents them from leaching into the groundwater. Moreover, the soil captures and stores water, making it available for absorption by crops, and thus minimizing surface evaporation and maximizing water use efficiency and productivity.


**Soil microbes added to seeds could boost crop production**

Communities of soil-dwelling bacteria and fungi are crucial to plants. They help plants take up nutrients and minerals from the dirt and can even extend root systems, providing more access to food and water. They also help plants grow, cope with stress, bolster immune responses and ward off pests and diseases. Now scientists at agricultural companies are digging through the dirt, like prospectors panning for gold, to find the exact microbes that make specific crops grow better. Agribusiness firms Novozymes and Monsanto are leading the way by coating seeds with microbes, planting them on farms across the U.S. and harvesting the crops to see how they fared.

Read more: [http://automotive.einnews.com/article/305007540/6j32qCtwWjlkpcZn](http://automotive.einnews.com/article/305007540/6j32qCtwWjlkpcZn)

**Soil policy in the EU**

Although agriculture and forests occupy 78% of the surface of the EU, currently there is not any clearly established soil policy in the EU, and only some member states have approved legislation. Though there are EU guidelines and policies on agriculture, water resources and pollution, lack of European legislation on soil does not ensure an adequate level of protection in Europe. However, the clear risk to achieve objectives on biodiversity and climate change led the EU to establish a Soil Thematic Strategy (2006) on soil protection. The Seventh Environment Action Program recognizes the progress made in the last decades, but still considers soil degradation risk as a serious problem, and that “unsustainable land use is consuming fertile soils, and soil degradation continues, resulting in impacts on global food security and the achievement of biodiversity targets”.


**Potential threats to soil biodiversity in the EU**

A recently published JRC article maps the potential threats to three categories of soil biodiversity (namely soil microorganisms, fauna and biological functions), and gives guidelines for identifying soils that are potentially at risk. Ranking the threats to soil biodiversity based on the knowledge of 107 soil experts from 21 countries, the study found the potential risk to soil biodiversity to be remarkably high. JRC developed normalised indices of potential risk to soil biodiversity based on assessments of the threat associated to 13 possible stressors: climate change, landuse change, habitat fragmentation, intensive human exploitation, soil organic matter decline, industrial pollution, nuclear pollution, soil compaction, soil erosion, soil sealing, soil salinisation, the use of GMOs in agriculture and invasive species. Data are available for the soil biodiversity threats plus the 13 input layers.

Read more: [http://esdac.jrc.ec.europa.eu/content/potential-threats-soil-biodiversity-europe](http://esdac.jrc.ec.europa.eu/content/potential-threats-soil-biodiversity-europe)

**Soil threats in Europe: status, methods, drivers and effects on ecosystem services**

This report presents some results of the RECARE project. One of the project’s objectives is to provide an improved overview of existing information on soil threats and degradation at the European scale. The report is written by a group of experts from the RECARE team, coordinated by Bioforsk. In total, 60 persons were involved in the process of writing, reviewing and editing. Eleven soil threats were considered: soil erosion by water, soil erosion by wind, decline of organic matter (OM) in peat, decline of OM in mineral soils, soil compaction, soil sealing, soil contamination, soil salinization,
desertification, flooding and landslides, and decline in soil biodiversity.


Quo grabis? – Working perspectives in soil science

2015 will be remembered as the International Year of Soils. But where is soil science going and how can young graduates gain a foothold in it? An evening of discussions goes beyond technical aspects and shows that many careers are open to young professionals – in academic and applied fields.


Patchwork ploughing: Australian farmer creates huge geometric artwork to fight soil erosion

A South Australian farmer has transformed his land into a gigantic geometric patchwork in a bid to fight soil erosion. Brian Fischer created the patterns at Ashmore White Suffolk Stud, north of Adelaide, following recent bushfires. In the absence of any vegetation, he says the furrows prevent gusting winds from causing further damage. “The fires cooked everything,” he told 3AW radio, “but whichever way the wind blows it’s always at 90 degrees [to the furrows] so it can’t get started”. The idea dates back to 1944 – if not earlier – when more than one million hectares of land were destroyed by a raging bushfire in Victoria. Fischer says the pattern took several days to plough but is saving him 15cm of topsoil.


21st Century US ‘dustbowl’ risk assessed

US scientists have modelled how a 1930s-like “dustbowl” drought might impact American agriculture today, and found it to be just as damaging.


Global nitrogen footprint mapped for first time

The first-ever global nitrogen footprint, encompassing 188 countries, has found the United States, China, India and Brazil are responsible for 46 percent of the world’s nitrogen emissions. The economic modelling, which grouped the nitrogen footprint into top-ranking bilateral trade relationships, noted a trend for increased nitrogen production and found developed nations largely responsible for emissions abroad for their own consumption.

Read more: https://www.sciencedaily.com/releases/2016/01/160125114124.htm

Why soil matters more than we realise

Personal view on soil on a blog by Richard Bardgett, Professor of Ecology at The University of Manchester and author of Earth Matters

Read more: http://blog.oup.com/2016/01/the-importance-of-soil/

Why Earthworms are Worth Keeping Around

Earthworms are your personal gardener. These little guys make organic fertilizer and rid your soil of disease and pests.

Read more: http://www.lawnecare.net/earthworms/


New Margaret Oliver Prize for Early-career Pedometricians

The IUSS Pedometrics Commission has decided to create a new award to recognize early-career scientists in their field. The prize will be given at each biennial international meeting of the Pedometrics Commission; the first prize will be given in Wageningen (NL) in 2017.


Newsletter 2 IUSS-working group on modelling of soil and landscape evolution

The second newsletter of the IUSS working group on modelling of soil and landscape evolution is available.


Online consultation for developing the Voluntary Guidelines for Sustainable Soil Management

The online consultation on the Voluntary Guidelines for Sustainable Soil Management (VGSSM), which was also published in the Newsroom of the IUSS Website, has come to an end. The quantity and especially the quality of the thoughtful comments received from more than 30 countries are fundamental and will now enable the
Intergovernmental Technical Panel on Soils (ITPS), the main advisory body to the Global Soil Partnership, to prepare the first draft of the VGSSM (end of March 2016). This draft will then be submitted to an Open-Ended Working Group for its finalization and submission to the Fifth Global Soil Partnership Plenary Assembly (23-25th May 2016). If endorsed by the Plenary Assembly, the draft VGSSM will be submitted to the Committee on Agriculture (COAG) for its review, and if endorsed, to the FAO Council.

Read more: http://www.fao.org/fsnforum/forum/discussions/soilguidelines

Quantifying the erosion effect on current carbon budget

The idea of offsetting anthropogenic CO2 emissions by increasing global soil organic carbon (SOC), as proposed during COP21 in the ‘four per mil’ initiative, is notable. JRC scientists coupled soil erosion into a biogeochemistry model, running at 1 km² resolution across the agricultural soils of the European Union (EU). Based on data-driven assumptions, the simulation took into account also soil deposition within grid cells and the potential C export to riverine systems, in a way to be conservative in a mass balance. In comparison with a baseline without erosion, we estimated a net C loss or gain of −2.28 and +0.79 Tg yr⁻¹ of CO₂eq, respectively, depending on the value for the short-term enhancement of soil C mineralization due to soil disruption and displacement/transport with erosion. Erosion fluxes were in the same order of current carbon gains from improved management. Even if erosion could potentially induce a sink for atmospheric CO2, strong agricultural policies are needed to prevent or reduce soil erosion.

Read more: http://esdac.jrc.ec.europa.eu/content/pan-european-soc-stock-agricultural-soils

The Remediated sites and brownfields – Success stories in Europe

This document is the results of an initiative of the Eionet National Reference Centres for Soil, which established in 2015 an ad-hoc working group on contaminated sites and brownfields in Europe. The objective was to collect cases and successful stories of remediated sites and brownfields, harmonise and facilitate exchanges of information on contaminated soils and soil remediation between the Eionet contributing countries. It aims to contribute to a better understanding of the remediation of contaminated sites and brownfields rehabilitation which is essential for sustainable land use management and to share best practices and new techniques, meanwhile raising awareness of the enormous efforts needed to succeed. This document presents many examples in various contexts and different European countries:


The first European earthworm map is drawn

Despite the abundance of earthworms in soils all around the world, there is a lack of information concerning the geographical distribution of many lumbricid species. Researchers from eight European countries have collected information on earthworm communities to map the biodiversity of these invertebrates and to put soil conservation on the political agenda.


Urban soil emits a surprising amount of CO2

A new study published in the journal Environmental Pollution shows that urban soil can emit up to 72 percent as much CO2 as fossil fuels burned within a city and at a rate of up to twice that of rural soils. And this is important, the researchers note, because most climate action plans only account for anthropogenic sources of CO2 like cars and buildings, not the seemingly innocent biological sources like dirt.

Read more: http://grist.org/science/urban-soil-emits-a-surprising-amount-of-co2/
Healing the soil - Repurposing abandoned urban lots starts with soil test

Chicago’s history of industrialization and urbanization left its mark on the soil. Soil acts as a sponge, and can host contaminants for years. In Chicago, the waste from industrial manufacturing causes undesirable toxic organic chemicals, heavy metals, and other chemicals to linger in the soil. A non-profit youth development center hopes to repurpose the lots into useful spaces for the community. However, the poor quality soils in the lots create challenges.

Read more: https://www.sciencedaily.com/releases/2016/02/160210135336.htm

Microbial diversity drives multifunctionality in terrestrial ecosystems

Despite the importance of microbial communities for ecosystem services and human welfare, the relationship between microbial diversity and multiple ecosystem functions and services (that is, multifunctionality) at the global scale has yet to be evaluated. Here we use two independent, large-scale databases with contrasting geographic coverage (from 78 global drylands and from 179 locations across Scotland, respectively), and report that soil microbial diversity positively relates to multifunctionality in terrestrial ecosystems. The direct positive effects of microbial diversity were maintained even when accounting simultaneously for multiple multifunctionality drivers (climate, soil abiotic factors and spatial predictors). Our findings provide empirical evidence that any loss in microbial diversity will likely reduce multifunctionality, negatively impacting the provision of services such as climate regulation, soil fertility and food and fibre production by terrestrial ecosystems.

Read more: http://www.nature.com/ncomms/2016/160128/ncomms10541/abs/ncomms10541.html

Grass-clover effective in removing soil phosphorus

When combined with regular mowing and removing the cuttings, growing grass-clover on phosphorus-rich soils is an effective technique for reducing soil phosphorus levels and accelerating the development of species-rich grassland. This is the conclusion of a recent article published in the March-April 2016 issue of the Journal of Environmental Quality. Based on long-term field studies in the Dutch province of Noord-Brabant, there are also strong indications that this method minimizes the amount of phosphorus leaching to surface water and groundwater. Phosphorus pollution is a major problem in the Netherlands, leading to reduced plant diversity and surface water algal blooms.

Read more: https://dl.sciencesocieties.org/publications/jeq/abstracts/45/2/701

Seven projects protecting soils around the world

The International Year of Soils came to a close on December 4, but that won’t be the end of the work for many soil projects. According to United Nations Secretary-General Ban Ki-moon, “soils are the foundation of food systems” and “are critical to achieving food security and nutrition.” Without governance and investment in measures to promote sustainable soil practices, further soil degradation could have enormous implications. Thankfully, farmers and scientists are finding ways to improve soils and increase food security. Here are seven influential projects and programs helping to restore the world’s soil.


Scientists just grew vegetables in ‘Martian’ soil — but there’s a catch

In “The Martian,” astronaut and botanist Mark Watney has to figure out how to make potatoes grow in the arid, alien soil of Mars. Real-life scientists are trying to do the same thing on Earth — even though no earthling has ever had access to Martian dirt. Scientists from the Dutch Wageningen University and Research Center say they have had surprising success with crops grown in a simulated Martian soil created by NASA. They’ve managed to make 10 species including peas and tomatoes yield produce by mixing in organic matter from Earth into the soil. This made it hold water better (the “moon” soil in particular is very hydrophobic) and provided nutrients for the growing plants.


Carbon farming is a zero-risk strategy for curbing climate change

Now that 195 nations, including the U.S., have agreed to ambitious greenhouse gas emission reductions to slow the pace of climate change, the question everyone is asking is: How will we actually meet our targets set for 2035? There is one
way that is zero-risk and builds on something farmers around the world are already motivated to do: manage soils so that a maximum amount of the carbon dioxide plants pull out of the air via photosynthesis remains on the farm as carbon-rich soil organic matter. “Carbon farming,” as it is sometimes called, is Mother Nature’s own geoengineering, relying on fundamental biological processes to capture carbon and sequester it in the soil, carbon that would otherwise be in the air as the greenhouse gas, carbon dioxide.


**Monthly rainfall erosivity (R-factor) & conversion factors for different time resolutions**

As a follow up and an advancement of the recently published Rainfall Erosivity Database at European Scale (REDES) and the respective mean annual R-factor map, the monthly aspect of rainfall erosivity has been added to REDES. The different time resolutions (from 5 to 60 min) of high temporal data require a conversion of monthly R-factor based on a pool of stations with available data at all time resolutions. Calibration factors for transferring the R-factor values between different time resolutions on a monthly scale have been produced and allow normalizing the monthly R-factor values to a common 30-min resolution. Seasonal patterns of rainfall erosivity in different regions of Europe are also shown.


**Tea Bag Index**

The Tea Bag Index (TBI) has the objective to create a global soil map of tea bag decomposition. The tea bag index measures decay of plant material by using two types of tea bags (green and rooibos). Tea bags are placed in the soil and weight loss is determined after three months. As the tea types are composed of different material, their decomposition is indicative for a two phased decomposition model, with a fast initial phase and a slower second phase when weight loss levels off. If you are interested to join this experiment, and agree with the terms and conditions, you can apply till 1 February 2017.


**Hidden Treasures**

Plant roots are vital components of the earth’s ecosystem. They are necessary for all plant growth, including the production of food and nutrients for humans and many other organisms. However, as root systems are out of sight, their beauty and importance often go unnoticed. Exposed: The Secret Life of Roots showcases the presence and importance of roots through visually stunning root representations using the work of agricultural ecologist Dr. Jerry Glover, sculptor Steve Tobin, and photographer Jim Richardson.

Read more at: https://m.usbg.gov/exposed-secret-life-roots#sthash.gUBZ1NxC.dpuf

**Peat mapping prize in Indonesia**

Last year, fires burned 2 million hectares of peatlands in Indonesia. The country wants to restore them. But first, it needs to know the extent and depth of its peatlands. The Indonesian government is now offering a million dollar prize for whoever can provide the best mapping solution.


**South Australia bushfires: Farmers fight to save topsoil after devastating 85,000-hectare blaze**

A huge expanse of normally productive farming land in South Australia’s mid north now looks more like a desert after a bushfire tore through 85,000 hectares last November, killing two people.


**Remediating brine-contaminated soils from the surface**

In the oil and gas industry, drilling and fracturing operations produce saline-sodic wastewaters (i.e., brines) as a by-product. These brines commonly contain salts at concentrations similar to or well above that found in seawater. When a brine is released into the environment, soil remediation is necessary, and most methods involve either leaching the salts below the root zone, a time-consuming process, or the complete excavation of the contaminated soil.

Dendrite formation following the infiltration of the crystallization-inhibitor ferric hexacyanoferrate in a brine-contaminated soil column is a new meth-
A recent article in Agricultural & Environmental Letters reports on a new method for removing salts from brine-contaminated soils. Unlike other brine remediation techniques, this new in situ method removes salts from the soil surface and may expedite the remediation process. Read more: https://dl.sciencesocieties.org/story/2016/apr/thu/remediating-brine-contaminated-soils-from-the-surface

Is there actually a “right way” to dig a hole for planting?
Protectoring your investment in your plants starts by digging a hole the right size, with the right conditions. If you dig the hole incorrectly, essentially all you do is create a bigger pot for your plant. Planting your transplants in the right type of hole can make all the difference in their success. Look at the difference in the same variety of tomato planted in holes prepared in different ways. Which tomato – or shrub or tree – would you prefer to have in your yard?
Read more: https://soilsmatter.wordpress.com/2016/03/24/is-there-actually-a-right-way-to-dig-a-hole-for-planting/

Top Honour for Work Down Under: Professor Alex McBratney Inducted as a Fellow of the Australian Academy of Science
Former IUSS Deputy Secretary General, Professor Alex McBratney, Dean of the Faculty of Agriculture and Environment of the University of Sydney has received one of Australia’s highest scientific honours, being inducted as a Fellow of the Australian Academy of Science on Monday 23 May 2016. “An accolade such as this brings soil science into the forefront of community thinking. It gives myself, and other scientists in this field recognition of the innovative, advanced and novel research being conducted. We are working to improve our understanding of the fundamental properties of this remarkable ‘skin’ of the Earth and determining how crucial soil is in contributing to growing food today and into the future,” said newly admitted Fellow, Professor Alex McBratney.

World Reference Base translated into several languages
The Polish translation was the first. The book can be ordered from the Polish Soil Science Society. The Spanish translation is ready and will be available soon. The French translation is advanced. If you are planning a translation of WRB into another language, please inform Peter Schad, Chair of IUSS Working Group WRB.
Contact: schad@wzw.tum.de

Keys (2.0) of Soil Taxonomy available in Spanish
The 12th edition of the Keys of Soil Taxonomy were recently translated into Spanish, the 11th edition was the first. After decades of working with soil scientists from around the world, NRCS decided it was important to increase awareness and expand knowledge of the value of soil and its impact on all aspects of life. Many soil scientists and other professionals from Latin America, the United States, and other countries will benefit from this translation effort for years to come. According to NRCS leadership, the translation will expand the horizons of U.S. Soil Taxonomy by allowing professionals in all parts of the world to apply and interpret the system in a more uniform and consistent way. While soils differ globally, the ability to apply a system that is universally understood and accepted is a goal shared by many soil scientists.

The direct and indirect impacts of EU policies on land
The 2011 Roadmap to a resource efficient Europe states, in its milestone of actions, to address land as a resource, that ‘By 2020, EU policies take into account their direct and indirect impact on land use in the EU and globally. This report presents a methodology for the assessment of European Union (EU) policies in terms of their land-related implications in Europe and provides an initial testing of the methodology across key EU policies and two in-depth case studies, which focus on Cohesion Policy spending on transport in Poland and Spain.
Read more: http://www.eea.europa.eu/publications/impacts-of-eu-policies-on-land

Probing impacts of fertilization on soil organic matter with light
Soil organic matter (SOM) is a primary determinant of soil quality, regulating many important characteristics and processes. It is exceedingly diverse and inextricably related to the myriad life forms in healthy soil. Studies of SOM typically employ a series of chemical extractions to remove operationally defined categories of SOM and then determine their properties by various means. A study in the latest issue of Vadose Zone Journal examined the
Upcoming Conferences and Meetings

2016

XXIII ISPRS Congress
Prague, Czech Republic, July 12-19, 2016.
The 23rd Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS) will be dedicated to the theme “From human history to the future with spatial information”. ISPRS is a leading organization in remote sensing, photogrammetry and spatial information sciences – very high-resolution satellite imagery, terrain based imaging and participatory sensing, inexpensive platforms, and advanced information and communications technologies. Every 4 years the Congress welcomes participants from all over the world, thus strengthening relations among the researchers, professionals and representatives of governmental and non-governmental organizations thus enhancing the co-operation within the field. Read more: http://www.isprs2016-prague.com/

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. Read more: http://www.eurosoil2016istanbul.org/

Meet the Editors of European Journal of Soil Science and Soil Use and Management at Eurosoil 2016
Professor Michael Goss, Editor-in-Chief of Soil Use and Management and Dr Margaret Oliver Editor-in-Chief of the European Journal of Soil Science will host a workshop session on preparing papers for international journals.
The session will be similar to that hosted at the Eurosoil meeting in Bari, providing advice to young authors with little experience of publishing in international journals. They will cover the best possible steps to take during preparation and submission of manuscript and offer advice on approaches...
to developing a scientific paper so that it will be accepted for publication.

The workshop will comprise a presentation of 30 minutes by the editors and a long question and answer session. The editors believe that this interaction with delegates is always a great success and they look forward doing this again in Turkey during Eurosoil Istanbul 2016.

8th International Acid Sulfate Soils Conference
College Park, Maryland; 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. The organizers hope to include components for the education of those less familiar with Acid Sulfate Soil issues and problems (including engineers, geologists, geographers, politicians/lawmakers, environmental control organizations and agencies and the general public). Three days will be designated for oral and poster presentations (July 18, 19 and 21). Additionally, three field tours are planned throughout the week (July 17, 20 and 22, 23).
Read more: http://www.midatlanticsoilscientists.org/acid-sulfate-soils-conference/

Edafología aplicada sobre los suelos del tropico mexicano
International Summer Course, Yucatán, Campeche, Tabasco y Chiapas, Mexico, July 18-28, 2016.
More information can be obtained from: suelos.tropico2016@gmail.com

Enzymes in the Environment: Activity, Ecology and Applications
Bangor, Wales, United Kingdom, July 24-28, 2016. 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 Extracel-

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.

3rd International Conference on Hydropedology
Beijing Normal University, Beijing, China, August 16-19, 2016. The conference theme is “Hydropedology and Natural Resources in the Earth’s Critical Zone for a Sustainable World”. This once-in-every-four-years event promises to be stimulating, informative, and enjoyable. A number of global leaders, active thinkers, energetic researchers,
young scientists, diverse students, industrial practitioners, and other professionals are expected to attend.

Read more: http://hydropedology2016.csp.escience.cn/dct/page/1.

International Colloquium on Soil Zoology (ICSZ)
Kasugano International Forum IRAKA, Nara City, Japan, August 22-26, 2016. Soil zoology is an important component of soil science. There is an increasing global demand for soil conservation. Knowledge on taxonomy, biogeography and ecology of soil animals is needed to understand the sustainable management of planet soil. We believe that this meeting will contribute to global soil conservation. Therefore, the meeting theme is “Biodiversity for Our Future Earth”.

Read more: http://soilzoology.jp/icsz_ica2016/

New Challenges and Strategies of Soil and Water Conservation in the Changing World Sustainable Management of Soil and Water Resources
Third World Conference of World Association of Soil and Water Conservation (WASWAC). Belgrade, Serbia, August 22-26, 2016. First Announcement and Call for papers. The registration form and detailed information is available at the conference website: http://3rdwaswacconference.sfb.bg.ac.rs/
Furthermore, there is an announcement of WASWAC Outstanding Youth Paper Award 2016: http://3rdwaswacconference.sfb.bg.ac.rs/WASWAC_Outstanding_Youth_Paper_Award_2016.html

International Conference on Agricultural Sciences and Food Technology for Sustainable Productivity and Nutritional Security
August 25-27, 2016, University of Agricultural Sciences, Bangalore, Karnataka, India. Registration and abstract submission is now open. Agricultural productivity, nutritional security and environmental sustainability require urgent and utmost scientific intervention at regional, national and international levels. This conference aims to provide a forum for scientific deliberations and research collaborations on agricultural sciences and food technologies in order to achieve the most alarming millennium goals of increasing agricultural productivity, while ensuring nutritional security and environmental sustainability.

Read more: http://www.sabt.org.in/asft-india/

35th International Geological Congress
The International Union of Geological Sciences (IUGS) and the International Geological Congress (IGC) will celebrate the 35th International Geological Congress in Cape Town, South Africa, 27 August - 4 September 2016. This is the main scientific event organized by IUGS – IGC every four years. Three core topics have been identified: Geo-science for Society, Fundamental Geoscience and Geoscience in the Economy. There will also be a section on Soil sciences: http://www.35igc.org/Themes/6/Soil-Science.
Read more: www.35igc.org

6th International Disaster and Risk Conference IDRC Davos 2016: ‘Integrative Risk Management – Towards resilient cities’
Davos, Switzerland, August 28-September 01, 2016. IDRC Davos is the world’s leading conference in Integrative Disaster and Risk Management, providing you with state of the art presentations about integrative risk management within high level panels, parallel and poster sessions as well as networking and advocacy opportunities.

Read more: http://www.idrc.info/

International Scientific Conference “Conserving Soils and Water 2016”
August 31-September 3, 2016, Atlantis hotel, Sarafovo district, Burgas, Bulgaria. The protection of natural resources is the most important issue for mankind. Scientists from all over the world are called upon to give their contribution for the protection of the riches of Nature and the welfare of mankind. The soil and water protection through the development of science and technologies is becoming a priority and a motivating factor in the life of many people and whole societies. Read more: http://www.conserving-soils.eu/

DBG/IUSS Joint Commission Meeting
September 1-2, 2016, Braunschweig, Germany. The DBG (Deutsche Bodenkundliche Gesellschaft) Commission I „Soil Physics and Soil Hydrology” of the German Soil Science Society and the Commission 2.1 „Soil Physics” of IUSS organize a joint commission meeting. The meeting will have a specific session dealing with the change of mechanical and hydraulic properties of soil by biological, chemical and physical factors. Prof. Paul Hallet, University of Aberdeen, will give a keynote on “Biological Control on Soil Mechanical and Hydraulic Properties”. Furthermore, the meeting offers room for
exchange on free topics of current soil physical research, according to the motto “My current interest”. In addition to the dissemination of the latest findings also “unfinished” work and questions are welcome that stimulate the scientific discussions between members of IUSS and DBG. This helps to identify current research trends in soil physics on an international level as represented by DBG and IUSS members. All members of DBG and IUSS are invited to present their current work. Interested members of other commissions are also welcome.


**Organic Phosphorus Workshop 2016**

Lake District, England, September 5-9, 2016. Following on from the successful meeting held in Panama in 2013, the organizers are delighted to announce a follow-on workshop for soil, water, plant and environmental scientists to come together to study and share ideas and innovation on the subject of “Organic Phosphorus in the Environment: Solutions for Phosphorus Security”. This 5 day workshop will include the following thematic sessions: Organic phosphorus flows in the environment in context with other nutrient cycles: Integration across ecosystems; Methods of evaluating organic phosphorus stocks, concentration and speciation; Biotic interactions in organic phosphorus cycling; Abiotic interactions of organic phosphorus in soil and waters: Stocks, flows and impact of scale and Global challenges for organic phosphorus research.

Read more: http://op2016.com

**International Conference Contaminated Sites 2016**


Read more: http://contaminated-sites.sazp.sk/

**The European Mineral Fertilizer Summit 2016.**

London, UK, September 14-15, 2016. Succeeding in the Fertilizer Market: Key Projections in the EU. The two day event will provide an exclusive platform in collaboration with Fertilizers Europe for discussion between a variety of industry perspectives including manufacturers, suppliers, distribution/logistics, academia and regulators homing in on the latest opportunities arising from plant technology and best practices within operational production. The main aim is to identify potential solutions, future work programmes and productive partnerships that overcome the key regulatory challenges and facilitate minimizing risk within the supply chain promoting access to safe and more efficient food security.

Read more: http://www.wplgroup.com/aci/event/european-mineral-fertilizer-summit/

**26th International Symposium on Soil Forming Factors and Processes from the Temperate Zone**

September 16-18, 2016, Iaşi, Romania.

Theme: Soil science and archaeology: research methods and perspectives; The main goal of the Symposium is to discuss the overall aspects regarding the integration of soil science with different disciplines from humanities and social sciences in order to assess long-term patterns of human-soil interactions over Holocene/Anthropocene timescales. This symposium will be relevant to researchers working in soil science, archaeology, geoarchaeology, bioarchaeology or cultural resources management.

**RemTech Europe 2016**

Ferrara, Italy, September 21-23, 2016. At the “RemTech Europe - European Conference on remediation markets and technologies”, leading European stakeholders will share information on knowledge, innovation and case histories, to encourage the development of remediation processes and the application of new and sustainable technologies, and to support the encounter between supplies and demands of available services and technologies, public and private. The themes of the Conference are regulations, current standards, fund raising, proven and innovative technologies, best practices introduced by some of the most important key players (public bodies & private companies).


**FACEing the future | food production and ecosystems**

Giessen, Germany, September 26-29, 2016.

How will primary production react to increasing atmospheric CO$_2$ and temperatures? Will yields and food quality change? What are the feedbacks between soil, plants and the atmosphere? Will ecosystem functioning change? And do experimentalists monitor what modellers need for their projections? This international conference will bring together leading scientists to discuss these issues...
and many more in a number of sessions. Please note that online registration is now available and submissions for oral presentations and posters are called for. For more detailed information and to submit an abstract please visit the conference webpage. In case you have any questions, please don’t hesitate to contact the Organizing Committee at info@face2face-conference.org.
Read more: http://www.face2face-conference.org

INSPIRE Conference 2016
Barcelona, Spain, 26-30 September 2016.
INSPIRE is about efficiently sharing digital spatial data related to the environment between public authorities at all levels of government, across borders and with the public at large. Such requires effective coordination between all authorities involved and a high degree of legal and technical interoperability, which is also pursued in the context of the EU Digital Single Market. As such, the INSPIRE Conference 2016 also aims to show how the implementation of INSPIRE contributes to the European Interoperability Framework and the EU’s digital economy in general.
Read more: http://inspire.ec.europa.eu/events/conferences/inspire_2016/page/home

Soil Landscape Modelling course
Wageningen, 3-7 October 2016
Following a recent review and the development of novel models, the soil-landscape modelling community now organises a soil-landscape modelling course for all interested PhD candidates, postdocs and other academics. Learning objectives include gaining an understanding of concepts and modelling approaches, and working on the participant’s own case studies with some of the available models. It is our intention to make course attendance as cheap as possible. Ask us about options for support if this course is very interesting for your work.
Read more: https://www.pe-rc.nl/soil-landscape-modelling

ISHS Symposium 2016 Sensing Plant Water Status - Methods and Applications in Horticultural Science
Potsdam (Campus Griebnitzsee), Germany, October 5-7, 2016.
This symposium will provide a platform to exchange findings on established and new methods in sensing plant water status- ranging from soil water uptake to plant canopies. Consequently, soil properties and soil water status will be a major topic.
Read more: http://www.spws2016.atb-potsdam.de/

Sustainable Development of Soil and Water Resources in Nile Basin Countries
Cairo, Egypt, October 17-19, 2016.
Conference topics: Soil resources in Nile basin countries and optimum management to overcome the encountered problems; Cooperation between Nile basin countries to control desertification, erosion, degradation and soil pollution; Sustainable agricultural development of Nile basin countries; Hydrology of Nile River; Water policies in the Nile basin countries. Causes and sources of pollution of Nile River; The scientific cooperation between Nile basin countries to control water pollution; Enhancement of scientific research cooperation between institutions in Nile basin countries. Abstracts submission deadline: end of June 2016. Full texts should be submitted no later than 31 August 2016.

XXI Latin American Soil Science Congress & XV Ecuadorian Soil Science Congress
Quito, Ecuador, October 24-28, 2016.
This conference will have the theme “All soils in the middle of the world” and will deal with soil, support of landscape diversity, life and culture.
Read more (in Spanish only): http://slcs.org.mx/images/Convocatoria_XXI_CLACS.pdf

VI Latin American Symposia of Educative Innovations in Soil Science
Due to the fact that there is no possibility of any change or advance toward sustainability, without considering a real educative change, the Latin American Soil Science Society and the Ecuadorian Soil Science Society invite to participate in the “VI Latin-American Symposia of Educative Innovations in Soil Science”, which will take place within the XXI Latin American Congress in Quito, Ecuador on October 26, 2016. The guests will be children between 10-12 years old, who will be representing the member countries of the SLCS, and will be able to show their works.
Read more (in Spanish only): http://slcs.org.mx
ICILUPSA-2016 International Conference on “Integrated Land Use Planning for Smart Agriculture”
November 10-13, 2016, Nagpur, India.
Organized by the Indian Society of Soil Survey and Land Use Planning (ISSLUP); the participants will deliberate on various emerging issues and the agenda for sustainable land management.
Read more: http://www.icilupsa2016.org/

15th International Conference on Soil Micro-morphology
Mexico City, Mexico; November 27-December 5, 2016.
This conference will be organized jointly with the IUSS Commissions 1.3 Soil Genesis and 1.6 Palaeopedology. The early registration fee for full participants at the Conference will be 200 €; the student fee will be 150 €, with appropriate verification of student status.
Read more: http://www.icsm.igeologia.unam.mx/

International Soil Classification Congress in South Africa
The congress proper will span three days, preceded by a four-day pre-congress field workshop. The field workshop starts the morning of 1 December in Pretoria and ends on 4 December in the evening in Bloemfontein. The field workshop will expose participants to the soils of Pretoria (manganiferous soils), Lichtenburg (aeolian, granitic and dolomitic agriculture soils), Potchefstroom (Technosols and aeolian agricultural soils), Sasolburg (high-activity clay agriculture soils), and the Vredefort meteor impact site. This congress is the official congress of IUSS Commission 1.4 (Soil Classification) and is supported by the Soil Science Society of South Africa and the University of the Free State.
Read more: http://scc16.co.za/

2017

1st World Conference on Soil and Water Conservation under Global Change (CON-SOWA)
June 12-16, 2017, Lleida (Spain).
A joint Conference of the “International Soil Conservation Organization” (19th ISCO Conference), the “World Association for Soil and Water Conservation” (Conference on Soil and Water Conservation of WASWAC), the “European Society for Soil Conservation” (8th ESSC Congress), the “International Union of Soil Science (IUSS-Commissions 3.2, 3.6), the Soil and Water Conservation Society (SWCS), the “International Erosion Control Association” (IECA) and the “World Association for Sedimentation and Erosion Research” (WASER), in parallel with the VIII Simposio Nacional sobre Control de la Degradación y Restauración de Suelos (SECS).
Read more: http://www.consowalleida2017.com/

IUSS Conferences of Commission 3.2: Soil and Water Conservation and Commission 3.6: Salt Affected Soils will be held in the framework of CONSOWA (see above).

Second Global Workshop on Digital Soil Morphometrics
For more information see www.digitalsoilmorphometrics.org

Pedometrics 2017
Pedometrics will be celebrating its Silver Jubilee in 2017. The first pedometrics conference was held in Wageningen in September 1992. This will also be a joint conference with four of its Working Groups: Digital Soil Mapping, Proximal Soil Sensing, Soil Monitoring, Modelling of Soil and Landscape Evolution, and Digital Soil Morphometrics.

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

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

Visual Soil Evaluation - Realizing Potential Crop Production with Minimum Environmental Impact
Edited by B C Ball, SRUC, UK, L J Munkholm, Aarhus University, Denmark.
October 2015, Paperback, 172 Pages, ISBN 9781780647456, Price: €49.50
Visual Soil Evaluation (VSE) provides land users and environmental authorities with the tools to assess soil quality for crop performance. This book describes the assessment of the various structural conditions of soil, especially after quality degradation such as compaction, erosion or organic matter loss. Covering a broad range of land types from abandoned peats to prime arable land, this useful handbook assesses yield potential across a range of scales. It also appraises the use of VSE in determining the potential of different land types for carbon storage, greenhouse gas emissions and nutrient leaching, and for diagnosing and rectifying erosion and compaction in soils.

Wetland Soils: Genesis, Hydrology, Landscapes, and Classification, Second Edition
By Michael J. Vepraskas, Christopher B. Craft.
December 2, 2015 by CRC Press, 508 Pages, ISBN 9781439896983, Price Hardback 84.15 GBP.
Wetland Soils: Genesis, Hydrology, Landscapes, and Classification, Second Edition contains 11 new chapters and additional updates written by new authors with a broad range of related field and academic experience. This revised work augments the previous material on wetland functions and restorations, while maintaining the field-oriented focus of the first book. The reworked text includes current coverage of hydric soil field indicators, wetland soils, chemistry of wetland soils, and wetland hydrology. This book explains how wetland soils are formed, described, and identified, defines the functions they perform, and serves to assist decision-making in the field.

Status of the World’s Soil Resources
By FAO, Natural Resources and Environment Dept., December 4, 2015, 650 p.
The SWSR will constitute the reference document on the status of global soil resources with a strong regional assessment on soil change. The information is based on peer-reviewed scientific literature, complemented with expert knowledge and reliable project outputs (mainly FAO ones). It provides a description and a ranking of ten major soil threats that endanger ecosystem functions, goods and services globally and in each region separately. Additionally, it describes direct and indirect pressure on soils and ways and means to combat soil degradation at all levels.

Soil Science Simplified, 6th Edition
By Neal S. Eash, Thomas J. Sauer, Deb O’Dell, Evah Odoi, Mary C. Bratz (Illustrator)
Already renowned as a user-friendly beginners’ guide to soil science, Soil Science Simplified, 6th Edition is an updated version of the beloved textbook that includes even more thorough applications of soil science to interdisciplinary fields. It includes the most recent research concerning uses of soil in municipal, engineering, and other areas, conversion agriculture covering no-till, hoe-till, and the methodology of cover crops, crop rotations, N contribution, and worldwide trends in conversion agriculture. The experienced authors have fully revised and updated the fundamental chapters on physical, chemical, and biological properties to create an ideal introductory text.
Soil Ecosystems Services
By Soil Science Society of America, Inc., 2015
Soils provide critical ecosystem services that make life on Earth possible. Develop an understanding of the essential role of soil in our ecosystem and its valuation. Soils support human life through agriculture, medicine, water purification, and raw materials for shelter. Soils regulate climate through soil carbon cycling. Soils culturally enrich our lives through landscapes and sense of place. Learn how these ecosystem services and more are evaluated and economically assessed. Engaging case studies demonstrate how soil properties and processes provide specific ecosystem functions. Readers will gain a new appreciation of the provisioning, supporting, regulating, and cultural services of soil. Discover how soil is essential to life! This book is being published according to the “Just Published” model, with more chapters to be published online as they are completed.

Read more: https://dl.sciencesocieties.org/publications/books/tocs/acessepublications/soilecosystemservices

Water Dynamics in Plant Production
By W Ehlers, University of Göttingen, Germany, M Goss, University of Guelph, Canada. Expected to be published in January 2016, hardback, 344 pages, 9781780643816, price: EUR 54.00; There is a potential discount for IUSS members.

This new edition of Water Dynamics in Plant Production focuses on the dynamics of water through the hydrologic cycle and the associated mechanisms that plants employ to optimize growth and development. It describes the basic scientific principles of water transport in the soil-plant atmosphere continuum, and explains the linkage between transpirational water use and dry matter production. Paying particular attention to the various agronomic strategies for adaptation to climate-driven limitations of water resources, the efficiency of water use in plant production and in achieving an economic yield is presented in detail. This book offers a multidisciplinary introduction to the fundamentals and applications of water dynamics in natural and managed ecosystems. Including text boxes throughout, as well as online supplementary material, it provides an essential state-of-the-art resource for students and researchers of soil and plant science, hydrology and agronomy.

Advances in Agronomy, 1st Edition
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.

Earth Matters: How soil underlies civilisation
For much of history, soil has played a major, and often central, role in the lives of humans. Entire societies have risen, and collapsed, through the management or mismanagement of soil; farmers and gardeners worldwide nurture their soil to provide their plants with water, nutrients, and protection from pests and diseases; major battles have been aborted or stalled by the condition of soil; murder trials have been solved with evidence from the soil; and, for most of us, our ultimate fate is the soil. In this book Richard Bardgett discusses soil and the many, and sometimes surprising, ways that humanity has depended on it throughout history, and still does today. Analysing the role soil plays in our own lives, despite increasing urbanisation, and in the biogeochemical cycles that allow the planet to function effectively, Bardgett considers how superior soil management could combat global issues such as climate change, food shortages, and the extinction of species. Looking to the future, Bardgett argues that it is vital for the future of humanity for governments worldwide to halt soil degradation, and to put in place policies for the future sustainable management of soils.

Scheffer/Schachtschabel Soil Science
tal to our existence, delivering water and nutrients to plants that feed us. But they are in many ways in danger and their conservation is therefore a most important focus for science, governments and society as a whole. A team of world recognised researchers have prepared this first English edition based on the 16th European edition.

The Soils of Spain
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.

Special Issue: International Soil and Water Conservation Research: Global Pioneers in Soil Conservation: Common Elements and Lessons Learned
This Special Issue of International Soil and Water Conservation Research was compiled to honor the pioneers, farmers, researchers, and extensionists, whose work, dedication, and innovation laid the foundation for Conservation Agriculture. Efforts to control land degradation and soil erosion can be traced over millennia, but generally results have not been great. However, certain farmers, called the “pioneers”, questioned tradition and implemented new theories and new technologies in soil conservation. They were supported by researchers and extensionists. Their successes are significant, because through these approaches the pioneers laid the ecological foundation on which a more sustainable agriculture could be developed. Their stories must be preserved before it is too late; we have much to learn from these forward thinking people. The papers include success stories from various regions including North and South America, Australia, Europe, and China. The papers are put in context with an international overview paper on global soil conservation.

90 years IUSS and global soil science
In this article the author describes the history and activities of the International Union of Soil Sciences (IUSS) and its predecessor the International Society of Soil Science (ISSS) in relation to some global soil science developments. The IUSS was founded in 1924 by soil scientists interested in establishing standardized methods of soil analysis and soil classification. In the past 90 years, 20 World Congresses of Soil Science were held, and thousands of smaller conferences, meetings and workshops. The IUSS is a global soil science organization and has 60,000 members who are organized into Divisions, Commissions and Working Groups that deal with all aspects of soil research.
Read more: http://dx.doi.org/10.1080/00380768.2015.1055699

Aktuelles und modernes Standard-Kartenwerk zum Thema Boden für die Bundesrepublik Deutschland; Der Atlas enthält in einer systematischen Abfolge sieben Kapitel mit geowissenschaftlichen und bodenkundlichen Grundlagenkarten, zu bodenphysikalischen und bodenchemischen Kennwerten, zum Wasser- und Stoffhaushalt des Bodens sowie zu Gefährdungen, zu Potenzialen und weiteren Darstellungen mit Bezug zum Bundes-Bodenschutzgesetz.
Read more: http://www.schweizerbart.de/9783510968558
Contaminated sediments represent an ongoing threat to the health of aquatic ecosystems. The assessment of sediment quality is, therefore, an important concern for environmental regulators. Sediment quality guidelines are now well established in regulatory frameworks worldwide; however, practical guidance that covers all of the key aspects of sediment quality assessment is not readily available. In 2005, CSIRO published its highly cited Handbook for Sediment Quality Assessment. In the ensuing period, the science has advanced considerably. This practical guide is a revised and much expanded second edition, which will be a valuable tool for environmental practitioners. Written by experts in the field, it provides coverage of: sediment sampling; sample preparation; chemical analysis; ecotoxicology; bioaccumulation; biomarkers; and ecological assessment. In addition, detailed appendices describe protocols for many of the tests to be used.

Biochar in European Soils and Agriculture - Science and Practice
This user-friendly book introduces biochar to potential users in the professional sphere. It demystifies the scientific, engineering and managerial issues surrounding biochar for the benefit of audiences including policy makers, landowners and farmers, land use, agricultural and environmental managers and consultants, industry and lobby groups and NGOs. The book reviews state-of-the-art knowledge in an approachable way for the non-scientist, covering all aspects of biochar production, soil science, agriculture, environmental impacts, economics, law and regulation and climate change policy. Chapters provide ‘hands-on’ practical information, including how to evaluate biochar and understand what it is doing when added to the soil, how to combine biochar with other soil amendments (such as manure and composts) to achieve desired outcomes, and how to ensure safe and effective use. The authors also present research findings from the first coordinated European biochar field trial and summarize European field trial data. Explanatory boxes, infographics and concise summaries of key concepts are included throughout to make the subject more understandable and approachable.

Geopedology. An Integration of Geomorphology and Pedology for Soil and Landscape Studies
This book offers a proven approach for reliable mapping of soil-landscape relationships to derive information for policy, planning and management at scales ranging from local to regional. It presents the theoretical and conceptual framework of the geopedologic approach and a bulk of applied research showing its application and benefits for knowledge generation relevant to geohazard studies, land use conflict analysis, land use planning, land degradation assessment, and land suitability analysis.

Our capacity to maintain world food production depends heavily on the thin layer of soil covering the Earth’s surface. The health of this soil determines whether crops can grow successfully, whether a farm business is profitable and whether an enterprise is sustainable in the long term. Farmers are generally aware of the physical and chemical factors that limit the productivity of their soils but often do not recognise that soil microbes and the soil fauna play a major role in achieving healthy soils and healthy crops. This book provides readily understandable information about the bacteria, fungi, nematodes and other soil organisms that not only harm food crops but also help them take up water and nutrients and protect them from root diseases. Complete with illustrations and practical case studies, it provides growers and their consultants with holistic solutions for building an active and diverse soil biological community capable of improving soil structure, enhancing plant nutrient uptake and suppressing root pests and pathogens.
Soil Water Measurement: A Practical Handbook
This book is written for all those involved in measurement of soil water phenomena, whether they be environmental scientists, field technicians, agronomists, meteorologists, hydrogeologists, foresters, physical geographers, civil or water engineers or students in these subjects. It contains a comprehensive description of all the major methods used for measurement of soil water content and potential, solute concentration, transport and balance of water and solutes, including recharge to groundwater aquifers. The emphasis is firmly on techniques which can be applied in the field or on samples obtained from the field. The theory and practice of the workings of the main instruments and methods available is described, along with practical tips on surmounting some of the main difficulties and explanations of many commonly encountered jargon words.

Triaxial Testing of Soils
Triaxial Testing of Soils explains how to carry out triaxial tests to demonstrate the effects of soil behaviour on engineering designs. An authoritative and comprehensive manual, it reflects current best practice and instrumentation. References are made throughout to easily accessible articles in the literature and the book’s focus is on how to obtain high quality experimental results.

Digital Soil Morphometrics
This book is about digital soil morphometrics which is defined as the application of tools and techniques for measuring, mapping and quantifying soil profile properties, and deriving depth functions of soil properties. The book is structured along four research topics: (i) Soil profile properties, (ii) Soil profile imaging, (iii) Soil depth functions, and (iv) Use and applications. The pedon is at the heart of digital soil morphometrics. The use of digital soil morphometrics exceeds the pedology and soil classification purpose that it currently serves – it is used in rapid soil assessment that are needed in a range of biophysical studies. Digital soil morphometrics has the potential to enhance our understanding of soils and how we view them. The book presents highlights from The IUSS Inaugural Global Workshop on Digital Soil Morphometrics held in June 2015 in Madison, USA.

True Truffle (Tuber spp.) in the World - Soil Ecology, Systematics and Biochemistry
This book focuses on the taxonomic diversity of the genus Tuber as economically important truffles. In contributions by internationally respected scientists, it examines truffle systematics, interactions with abiotic and biotic environments, strategies for spore dispersal, and molecular processes in truffles. Topics discussed include: evolutionary theories and phylogeny of Tuber species from Asia, Europe and North-America; the influence of climate on the natural distribution of Tuber species and fruiting body production, soil characteristics and vegetation in natural habitats; tools for tracking truffles in soil, host diversity, truffle inhabiting fungi and truffle-associated bacteria; and the relationships of small mammals and wild boars with truffles, as well as the smell of truffles. This book offers a valuable reference guide for all researchers working in the fields of mycology, ecology and the soil sciences, and will also be useful for farmers and foresters interested in truffle cultivation worldwide.

Soil in Criminal and Environmental Forensics - Proceedings of the Soil Forensics Special, 6th European Academy of Forensic Science Conference, The Hague
By H. Kars, L. van den Eijkel (Eds.), Series: Soil Forensics, 1st ed. 2016, XII, 361 p. 106 illus., 77 illus. in color, ISBN 978-3-319-33115-7, price hardcover € 229,00.
This introductory volume to a new series on Soil Forensics gives a kaleidoscopic view of a developing forensic expertise. Forensic practitioners and academic researchers demonstrate, by their joint contributions, the extent and complexity of soil forensics. Their reports exemplify the broad range of sciences and techniques applied in all stages of forensic soil examinations, from investigations at crime scenes to providing evidence.
that can be used in court proceedings. Moreover, the necessity is depicted of co-operation as a condition for any work in soil forensics between scientists of different disciplines, but no less between scientists and law enforcers. Soils play a role in environmental crimes and liability, as trace evidence in criminal investigations and, when searching for and evaluating, buried human remains. This book shows soil forensics as practiced in this legal context, emerging and solidifying in many countries all over the world, differing in some respects because of differences in legal systems but ultimately sharing common grounds.

**The Nature and Properties of Soils**
This edition updates a narrative that has been at the forefront of soil science for more than a century. It has evolved to provide a globally relevant framework for an integrated understanding of the diversity of soils, the soil system and its role in the ecology of planet Earth. This is the first edition to feature full-colour illustrations and photographs throughout. In addition to hundreds of new illustrations and references, this edition addresses the many changes in soil science thinking during the past decade or so.
Advances in Agronomy, 1st Edition
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.

Book Pasión por la tierra, Crónicas de naturaleza y territorio
Based on his environmental/scientific articles published in the newspaper El Mundo, the author offers a wide variety of topics related to the curiosities and secrets of the functioning of the natural world around us, their connection with society, people and science. In general, the set of articles offers two approaches to nature. Sensory and aesthetic aspects bring us recreation and excitement. The other approach is to understand and decipher the occult. It is fascinating to feel and appreciate what happens in nature but last but not least we want to know why it happens and how it affects us. Two visions - each of them more exciting than the other.
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Modeling Methods and Practices in Soil and Water Engineering
This book discusses the development of useful models and their applications in soil and water engineering. It covers various modeling methods, including groundwater recharge estimation, rainfall-runoff modeling using artificial neural networks, development and application of a water balance model and a HYDRUS-2D model for cropped fields, a multi-model approach for stream flow simulation, multi-criteria analysis for construction of groundwater structures in hard rock terrains, hydrologic modeling of watersheds using remote sensing, and GIS and AGNPS.

Soil and Water Engineering - Principles and Applications of Modeling
Modeling aspects have added a new dimension in research innovations in all branches of engineering. In the field of soil and water engineering, they are increasingly used for planning, development, and management of land and water resources, including analysis of quantity and quality parameters of surface and ground water, flood forecasting and control measures, optimum allocation and utilization of irrigation water. The application of these models saves considerable time in decision support systems and helps in conservation and optimum allocations of scarce precious natural resources.

Rainfall-Induced Soil Slope Failure - Stability Analysis and Probabilistic Assessment
The book integrates probabilistic approaches with the geotechnical modeling of slope failures under rainfall conditions with unsaturated soil. It covers theoretical models of rainfall infiltration and stability analysis, reliability analysis based on coupled hydro-mechanical modelling, stability of slopes with cracks, gravels and spatial heterogenous soils, and probabilistic model calibration based on measurement. It focuses on the uncertainties
involved with rainfall-induced landslides and presents state-of-the-art techniques and methods which characterize the uncertainties and quantify the probabilities and risk of rainfall-induced landslide hazards.

**Global Soil Biodiversity Atlas**

On 23 May 2016, the European Commission’s Joint Research Centre (JRC) and the Global Soil Biodiversity Initiative (GSBI) published the first-ever Global Soil Biodiversity Atlas that maps the soil biodiversity of the entire planet. This unique Atlas pays tribute to soil — the silent engine that keeps the planet alive — by providing a detailed analysis of soil organisms and the threats to soil biodiversity at global scale. The Atlas was formally launched by the JRC and GSBI at the 2nd UN Environment Assembly (UNEA) in Nairobi on 25 May 2016.

The Atlas describes soil as habitat for the diversity of organisms that live under our feet. At the same time, it draws attention to the threats to soil biodiversity, such as invasive species, pollution, intensive land use practices or climate change. The Atlas provides current solutions for a sustainable management of soils.

It was coordinated by the JRC and the GSBI with more than 70 contributing organisations (including IUSS) and several hundred individual contributions. It illustrates the diversity of soil organisms, explains their geographical and temporal distribution, the ecosystem functions and services provided by soil biota. Most importantly, it draws attention to the myriad of threats to soil biodiversity. These include inappropriate land management practices (e.g. deforestation, land take for infrastructure development), agricultural systems, over-grazing, forest fires and poor water management (both irrigation and drainage). Other practices such as land conversion from grassland or forest to cropped land result in rapid loss of soil carbon, which indirectly enhances global warming.

The Atlas shows that mismanaging soils could exacerbate the effects of climate change, jeopardise agricultural production, compromise the quality of ground water and worsen pollution. It also proposes solutions to safeguard soil biodiversity through the development of policies that directly or indirectly target soil health, leading to a more sustainable use.

**Partners**

The Editorial Board of the atlas comprised the European Commission’s Joint Research Centre, the University of Manchester, the Consultative Group for International Agricultural Research - World Agroforestry Centre, Agriculture and Agri-Food Canada, University of Vigo, Institute of Research for the Development France, Wageningen University, Netherlands Institute of Ecology, London Natural History Museum, University of Colorado, University of Reading, Lund University, Harper Adams University, Northern Arizona University, University of Hohenheim, Yokohama National University, Pierre and Marie Curie University, French National Institute for Agricultural Research, University of Lavras, University of Göttingen, University of Western Sydney, and Colorado State University.

**How to obtain the atlas**

A digital version of the atlas is available for free download via the JRC, the GSBI and the EU Bookshop. Printed copies can be purchased from the EU Bookshop (176 pages, ISBN: 978-92-79-48169-7, price EUR 25).


By Alberto Orgiazzi (JRC), Diana Wall (GSBI), Ellen Kandeler (IUSS, Commission 2.3)

**Satellite Soil Moisture Retrieval**


Satellite Soil Moisture Retrieval: Techniques and Applications offers readers a better understanding of the scientific underpinnings, development, and application of soil moisture retrieval techniques and their applications for environmental modeling and management, bringing together a collection of recent developments and rigorous applications of soil moisture retrieval techniques from optical and infrared datasets, such as the universal triangle method, vegetation indices based approaches, empirical models, and microwave techniques, particularly by utilizing earth observation datasets such as IRS III, MODIS, Landsat7, Landsat8, SMOS, AMSR-e, AMSR2 and the upcoming SMAP.
Digital Soil Mapping Across Paradigms, Scales and Boundaries
This book contains papers presented at the 6th Global Workshop on Digital Soil Mapping, held 11-14 November 2014 at the Institute of Soil Science, Chinese Academy of Sciences of Nanjing, China. This book provides a comprehensive overview of the state of the art in digital soil mapping, enriches understanding of global soil grids both at national and continental level and explores strategies for bridging research, production, and environmental applications in DSM.
Read more: http://www.springer.com/de/book/9789811004148
An Ode to Soil Orders

By Pete Bier

It’s about time you got down to hard-core learning
Cause I know you got some really good questions burning
About soil, which is affected by parent material and time
As well as climate, relief, and organisms like thyme.
We’ll spend time talking about all 12 soil orders
That range far and wide across international borders.

We’ll start with the youngest soil order out there
Which are Entisols, derived from recENT should you care.
They usually only have an A horizon, no E, C, or D.
They’re also a very large group with great diversity.
You can find them on rocky hillsides or large river valleys.
Not preferred for crops, they can still put food in your galleys.
After a great deal of weathering, a new soil order have we. The great Inceptisols is what this next soil order will be. They have slight horizonation, surely more than the former. And they can be found both in climates colder and warmer. More people live on these, than any other order we’ll name, Its poor horizonation has its resistant parent material to blame.

After many more years, another soil order does not tarry. Next comes the great Mollisol, the soil order of the Prairie. It might have an A, B, and C horizon, but usually no O. It’s also incredibly fertile, helping many plants to grow. It has tremendous organic matter from dead plants of before, And you’ll drive right over them, they’re halfway shore to shore.

We’ll now take a break from this weathering schtick, And talk about how climate affects how an order gets picked.

Aridisols are formed in places with no rain at all, Regardless if its winter, spring, summer, or fall. They can accumulate calcium carbonate and other such salts But don’t blame the soils, it’s truly the climate’s fault. They can have a high pH, which means they are a base, not acid. They’re in the Western US, you won’t find any in Lake Placid.

Let’s look at temperate forming soils, not rain that is lacking. The Gelisol can be found where you go Polar Bear tracking. They must have permafrost at least 2 meters under your feet. When it comes to sinking carbon, this soil cannot be beat. And consider yourself lucky if you witness their cryoturbation. But that won’t happen until your next Arctic exploration.
Spodosols are a product of climate to a certain extent,
But they absolutely must have a spodic subsurface content.
These horizons have black or red amorphous material.
And they have an E horizon, which is crazy looking, for real!
The climate affects these soils, by preventing decomposition.
Which limits inputs of new matter, as the old move down in position.

Now, there’s another unique entity that can dictate order as well.
Soil order can depend heavily on its parent materiel.

A Histosol is an order with parent material needs.
Organic matter definitely must be this soil’s seeds.
You need to have organic carbon at least 20 cm thick.
They’re mucks, peats, and bogs. Your feet just might stick.
Most of these soils are saturated for the entire year,
And if you’re in Madison, some are just north of here.

In this next case, volcanoes are this soil’s driving factor,
And they have been known to do fairly well neath the tractor.
Andisols are formed from volcanic ash of very old.
They’re in the Pacific, but also Iceland, which is cold.
They have a low color value, which is dark to the eye.
And their melanic horizon must be 30 cm high.

Finally, Vertisols is our last soil order of this group.
And believe me, this one will really throw you for a loop.
They’re rich in shrink-swell clays, which get bigger and smaller.
Don’t build a basement here, or you’ll be destined for squalor.
They can be found down south, near Louisiana and Texas.
I hope after this explanation, Vertisols don’t continue to vex us.

Now if climate or its parents don’t dictate its formation,
Weathering once again resumes our soil fascination.
The prairie Mollisols will change after many a fortnight,  
And trees will start to grow everywhere in your sight.  
They’ll give way to the Alfisol, an order to be respected.  
High fertility and moderate leaching can be expected.  
This soil is great for both Axe-man and farmer.  
Antigo silt loam is our favorite. We will never harm her.

After many an eon, our soils can change once again.  
They’re common down south, where the Civil War did begin.  
Ultisols are intensely weathered, with whole lots of clay.  
And they’re found in areas, where its humid all day.  
Their cation exchange capacity is not usually the highest.  
It’s not my favorite soil order, but from Wisconsin, I’m biased.

Lastly we come to the splendid Oxisol.  
This soil order is the most highly weathered of all.  
Their oxide minerals tend to make them very red.  
They have low fertility, but this soil isn’t quite dead.  
They don’t hold on to nutrients, except for Phosphorus.  
There’s none in Wisconsin, which is lucky for us.

There you have it, you’ve learned about the orders, all twelve.  
And into a book, you didn’t even have to delve.  
You know what they’re made of, and how they might look.

You know if they’re fertile and produce things you can cook.  
You know where to find them, say, the Arctic or Madagascar.  
You know, I think this poem is over, let’s head to the bar.

Pete Bier
(All soil images are copyright USDA)
In memoriam

Marcel Jamagne
1931-2015

Marcel Jamagne passed away in Orléans on September 30th 2015. He was born in Brussels on November 17th, 1931.

Originally Belgian, he took the French nationality in 1978. Marcel Jamagne studied agricultural engineering specializing in waters and forests at the Faculty of Agricultural Sciences at Gembloux. After his military service as reserve officer of the armed forces, he started his career as soil mapper at the INEAC Division ‘Agrology’. INEAC stands for: National Institute for Agronomy in Belgian Congo (presently, the Democratic Republic of the Congo).

This team of soil prospectors worked under the leadership of the late Carl Sys who was to eventually join Ghent University as professor of tropical soil science. During his time in the Congo, Marcel Jamagne conducted two important soil survey missions: one of Tshuapa in the lower Congo basin and one of Maniema near South Kivu. He also participated in editing the reference book “Mapping the soils of Congo, Principles and Methods” (Sys, 1961), which was the first published manual in French on soil mapping methods. After his return to Belgium in August 1960, upon the dramatic events taking place during the independence struggle, he joined the Belgian Centre of Soil Mapping (Director: René Tavernier) and participated in the pedological soil prospection of the Ardennes in collaboration with Joseph Deckers (the father of Seppe).

At the same time in France, Jean Hébert, INRA director of the agronomy unit at Laon, created the Service of Soil Mapping of the département de l’Aisne. The mission of this young service was to establish a soil map at medium scale (1/25 000), starting from field survey data at a small scale (1:5000) for the whole département. In order to develop this service, Jean Hébert, aware of identical work carried out for the soil map of Belgium, made contact with René Tavernier so as to obtain his collaboration in terms of an experienced pedologist. Thus, in 1961 Marcel Jamagne became Director of the Service of the Soils of the Aisne till 1969. During all those years “Jamagne”, the Service flourished thanks to his competence, his efficiency and his outreach. The Service of the Aisne not only gained an excellent reputation nationally but also at European level. Marcel Jamagne encouraged his colleagues to engage in pedological studies (pedogenesis) as well as in continuous professional education. He himself obtained his degree in soil mapping (1966) from the University of Ghent, where he presented a thesis on the micromorphology of soils developed from Loess.

Based on these soil mapping experiences in Belgium, in the Congo and France, he published a reference book on ‘field soil science’, which was to become a prime reference book for many pedologists, entitled “Base and techniques of soil mapping” (INRA, 1967). In parallel, he undertook fundamental research on the evolution of leached soils of the Paris Basin, the results of which were summarized in his doctoral thesis at the Faculty of Agricultural Sciences of Gembloux University in 1973, entitled: “Contribution to the pedogenetic study of loess formations of Northern France”.

During this time Marcel Jamagne contributed to the French soil classification system which was elaborated upon by Jean Boulaine and Rene Bé-
tremieux and which was launched in 1967. Meanwhile (1967-1968), Gustave Drouineau, general inspector of INRA argued for the creation of the Service of Soil Study and of the Soil Map of France (SESCPFP), and in 1969 Marcel Jamagne was assigned Director of this new Service. This Service was initially installed at the Research Centre INRA at Versailles and it focussed mainly on soil mapping at a scale of 1:100 000 on IGN sheets, using a taxonomic soil classification. In 1982, the Service moved to new premises in Orléans. Slowly soil mapping units evolved towards a representation of landscape sequences based on the notion “soilscape”. Under the influence of Marcel Jamagne, the dynamic of SESCPF led to numerous research activities which generated an in-depth understanding of the soil distribution, the fundamental behavior and the functioning of the soil in its natural environment. With its installation at Orléans, the Service was enriched with a soil physics and soil mineralogy laboratory as well as a soil informatics unit.

In 1990, the programme IGCS (Inventory, Management and Soil Conservation) developed a database at a scale of 1:250 000 for the great administrative regions of France and for the reference sectors; documents at a scale of 1:10 000 replaced the initial programme at 1:100 000. In addition to all these efforts at national level, Marcel Jamagne participated in different European and other international programmes (FAO, UNESCO, EEC later EU), particularly through the EU-Joint Research Centre (JRC) at Ispra, Italy. Thanks to the recognized competence of the ‘Service’, it progressively became the focal point of different programmes such as the Soil Geographical Data base for Eurasia and the Mediterranean. Furthermore, Marcel Jamagne engaged in programmes of Latin America and Asia. Marcel Jamagne can be considered the father of soil mapping in France and one of the fathers of soil mapping in Europe. He officially left the direction pavilion of SESCPF in 1997 when it split up in two units: ‘Infosol’ and ‘Soil Science’. INRA then nominated him ‘Director of Research Emeritus’ in charge of mission. However, did he ever retire? In charge of mission, he continued to be implicated in the programme of the ‘Geographical Data Base of the Soils of Europe’. He continued to intervene (1994-2001) in the national diploma of pedology and particularly in field surveys. He edited a remarkable synthetic oeuvre on the soils of France entitled: “The Grand Soilscape of France” (Quae, 2011). A few weeks before passing away, he was still working on the update of a soil map at a scale of 1:100 000.

Marcel Jamagne was a member of the Agricultural Academy of France and a honorary member of the International Union of Soil Sciences, cavalry of the honorary Legion and Merited Agricultural Officer (France). He was president of the French Association for Soil Studies (1996-1999) and vice-president of the IUSS (1994-1998). Apart from being an exceptional scientist and remarkable leader, Marcel Jamagne was an extremely warm person, very human, with a sparkling look in his eyes, a smart smile, always having the right word for rekindling the good spirit. If he had one personal ambition, one of delivering his work to the utmost perfection, he was equally preoccupied with the promotion of his collaborators, from the smallest technician up to the engineer. Marcel Jamagne was an exceptional and inexhaustible worker. How many weekends did he spend reviewing texts of publications and reports, how many evenings working in his office or at the table in his living room until fatigue obliged him to take some rest! All this work load, all these publications could never have been realized but thanks to the love of Christiane, his wife, who accepted a sacrifice others would have refused. Anybody who knew him, either from close or from a distance will never forget him, Marcel Jamagne, league of the Soil Science, a heritage, a richness and a remarkable importance which will mark our discipline for a long time.

By Clément MATHIEU
Joselito Arocena 1959-2015

Joselito (Lito) Arocena passed away on Sunday 20th December 2015, at the age of 56, a few months after he was diagnosed with cancer. He had a bachelor’s degree in Agriculture from the University of Philippines-Los Baños, an MSc in Soil Science (Soil genesis and classification) from the University of Ghent (Belgium), and a PhD from the University of Alberta (Canada). He was a founding member of UN British Columbia (Canada) and became its first Canada Research Chair in 2001.

Although he was mainly a soil mineralogist, his research covered almost all fields of soil science, from unravelling the mechanisms of mineral weathering to the study of the alterations of soil properties after fire or to decipher soil-biota interactions. He also did applied research on plant nutrition, and soil pollution and remediation of mined and polluted sites. He had a strong micromorphology formation, after his MSc at the U. Ghent. Thanks to him we can successfully apply methodologies of removal of Fe and Mn on thin sections in order to study their distribution and to unmask previous clay illuviation features.

He was an enthusiastic soil scientist and soil micromorphologist, who fostered these disciplines and demonstrated their usefulness for other fields of science, including forensic sciences, and for the well being of human kind. We can say that we lost an outstanding scientist, but above all, a very good friend and person who always had an answer and helped everybody, from undergraduate students to old professors. I will always remember his permanent smile and our e-mail chats on all subjects of life, in particular on soccer (he was a strong FC Barcelona supporter!). We will miss him in so many ways.

I want to express my sincere condolences to his loving wife and children. Rest in Peace.

By Rosa M Poch
On the 20th of January 2016, Professor Dr. rer. hort., Dr. hc. Udo Schwertmann died in his house in Freising-Weihenstephan, Germany, shortly after his 88th birthday after a more than fulfilled scientific life. He will be missed not only by his family but also by the international soil science community and un-counted colleagues and friends all over the world.

Udo Schwertmann was born November 25, 1927, in Stade, Germany. After learning horticulture in a tree nursery he studied at first horticulture and then chemistry at the Technische Hochschule of Hannover (now Leibniz University of Hannover). He finished his Ph.D. in 1958 and his habilitation in 1961, both in soil science, in Hannover under the well-known promoter Prof. Dr. P. Schachtschabel. In 1962, he was a Fulbright Scholar and carried out research in the laboratory of M.L. Jackson at the University of Wisconsin, Madison. Based on his outstanding creativity and knowledge he was appointed full professor and head of the Institute of Soil Science at the Technical University of Berlin in 1964. Before he was appointed full professor and head of the newly founded Institute of Soil Science in Freising-Weihenstephan in September 1970 at the Technical University of Munich (TUM), he spent his first six-month sabbatical in southeastern Australia. He held his position as head of the Institute of Soil Science in Freising-Weihenstephan until his retirement in September 1995.

We certainly have to commemorate his work on the occurrence, formation and identification of iron oxides in soils, but also his work in soil clay mineralogy, soil erosion (starting already in 1972; extended laboratory and field studies [2 field rainfall simulators]), phosphorous in soil, cation adsorption, and soil acidity (acid rain). He first described the structure, formation and properties of the mineral „Schwertmannite“, named after him by the International Mineralogical Association.

Udo Schwertmann published more than 200 research papers, numerous book chapters and several monographs. Udo Schwertmann’s 1964 publication on the extraction of poorly crystalline iron oxide minerals from soils with oxalate has become the reference for investigating these minerals in soil science laboratories around the world and is continuously cited. “The Iron Oxides”, together with R. Cornell is still considered the bible on this topic. Udo Schwertmann’s legacy is forever connected with our understanding of the formation and properties of iron oxides in soils. He was also the driving force for the adaptation of the USLE [Universal Soil Loss Equation] for conditions in Germany and Central Europe (published in German in 1987). His internationally acclaimed outstanding knowledge is also documented in the famous textbook, Scheffer Schachtschabel: Lehrbuch der Bodenkunde (Soil Science textbook), which he co-authored for more than 20 years.

Udo Schwertmann was a scientific leader, among others supervising 5 habitations and ~30 PhD theses. His institute was in high demand by several guest scientists from Australia, Brazil, Italy, Japan, Poland, South Africa, USA and some other countries, and from time to time he spent several weeks abroad. He served on the editorial board of several soil science and clay mineralogy journals and many advisory boards, e.g. DFG. His activities included service as Vice-President of the German Soil Science Society, Chairman of Commission VII of the International Society of Soil Science (now IUSS), and General Secretary and Vice-President of the Association Internationale pour l’Étude des Argiles (AIPEA). He is a former editor of Zeitschrift für Pflanzenernährung und Bodenkunde (now Journal of Plant Nutrition and Soil Science [JPNSS]) and has been a member of the editorial boards of
Udo Schwertmann received numerous scientific awards. He became a Fellow of the American Society of Soil Science in 1992 and a member of the „Akademie der Naturforscher” Leopoldina zu Halle, the oldest German Academy of Science. The Clay Mineral Society appointed him „pioneer in clay science” in 1992 and a distinguished member in 1997. In 1995 he received an honorary doctorate from the Christian-Albrechts-Universität zu Kiel in Germany. In 1997 he was appointed honorary member of the German Soil Science Society. In 2005 he was awarded the Philippe-Duchaufour-medal of the European Geophysical Union „for outstanding research in the field of fundamental and applied soil science, with special emphasis on his contributions to soil mineralogy and genesis”. Prof Schwertmann was convinced that only the link between processes on the micro- and macro-scale enable us to completely understand soil formation processes under in situ conditions. The international soil science community, including his colleagues, students and friends, joins in expressing gratitude for having known and worked with Prof. Schwertmann. We will continue to cherish his memory.

*By Dr. H.H. Becher, Süderbrarup*
### IUSS Honorary Members

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## IUSS Honorary members (Continued)

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## IUSS Award Winners

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