



Food and Agriculture
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CONCEPT NOTE
and AGENDA

21 - 23 | MARCH 2017 | FAO - ROME, ITALY
GLOBAL SYMPOSIUM ON
SOIL ORGANIC CARBON
UNLOCKING THE POTENTIAL OF MITIGATING
AND ADAPTING TO A CHANGING CLIMATE

#GSOC17



GLOBAL SOIL
PARTNERSHIP



INTERGOVERNMENTAL PANEL ON
climate change



INTERGOVERNMENTAL
TECHNICAL PANEL ON SOILS



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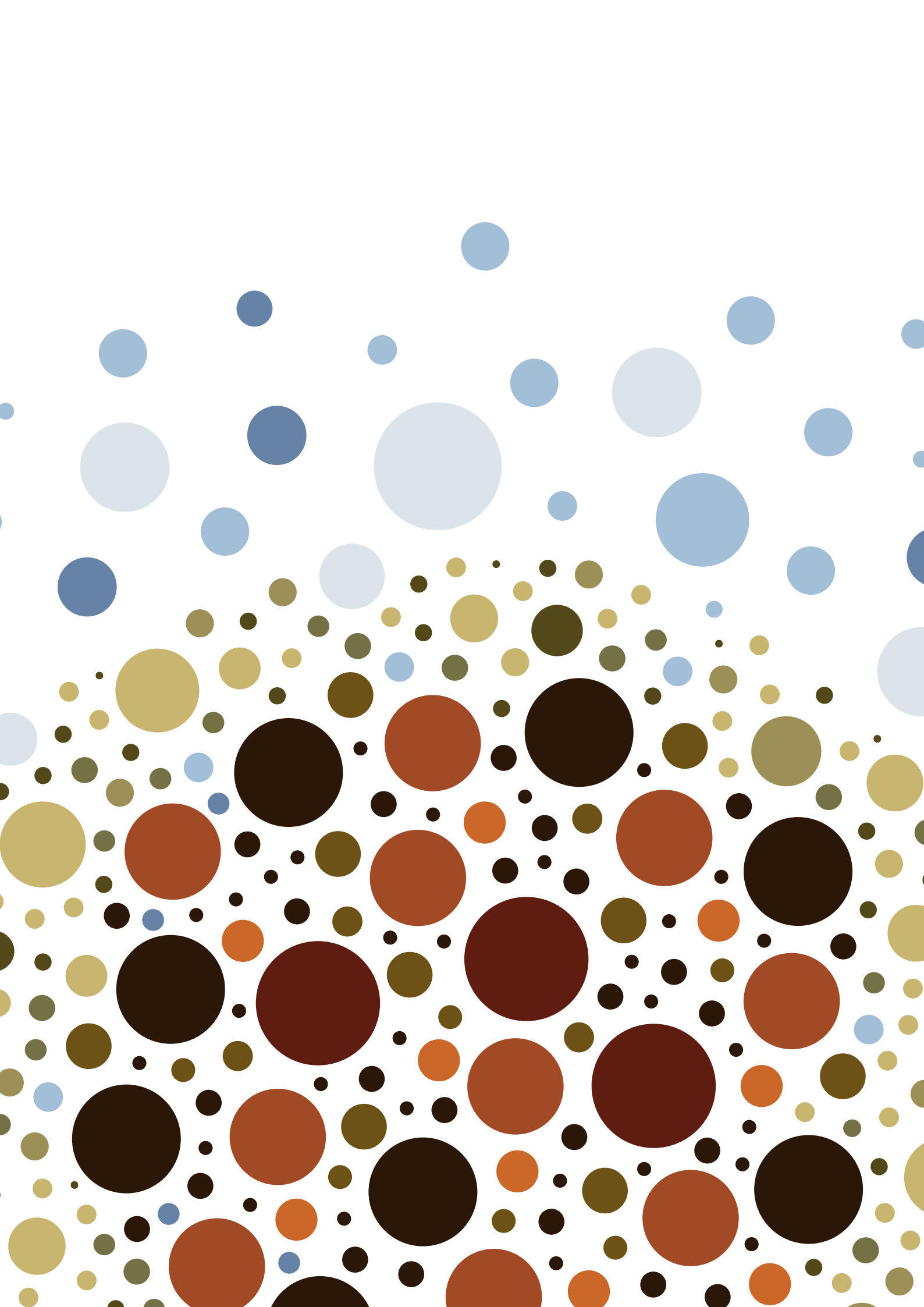
Science-Policy
Interface



United Nations
Convention to Combat
Desertification



World
Meteorological
Organization



CONCEPT NOTE

GLOBAL SYMPOSIUM ON
SOIL ORGANIC CARBON
(GSOC17)

Co-organized by FAO, GSP/ITPS, IPCC, UNCCD-SPI and WMO

21 – 23 MARCH 2017
FAO HQ, ROME, ITALY

www.fao.org/about/meetings/soil-organic-carbon-symposium



INTRODUCTION

In the presence of climate change, land degradation and biodiversity loss, soils have become one of the most vulnerable resources in the world.¹ Notwithstanding the enormous scientific progress made to date, protection and monitoring of soil resources at national and global levels still face complicated challenges impeding effective on-the-ground policy design and implementation that varies widely from region to region. There is still insufficient global support for the protection and sustainable management of the world's soil resources.

Soils host the largest terrestrial carbon pool² and play a crucial role in the global carbon balance by regulating dynamic bio-geochemical processes and the exchange of greenhouse gases (GHG) with the atmosphere.³ Soil organic carbon (SOC) stocks amount to an estimated 1,500 ±230 GtC in the first meter of soil, nearly twice as much as atmospheric carbon (828 GtC as CO₂).⁴ After the burning of fossil fuels, land use and land cover change (which includes agriculture) is the largest anthropogenic source of carbon into the atmosphere⁵ and within agriculture, soils have been a global net source of GHGs.⁶ These processes and emissions are strongly affected by land use, land use change, vegetation cover and soil management. SOC stocks in the upper soil layers (800 GtC in 0-40 cm)⁷ are especially sensitive and responsive to such changes in land use and management, which provides an opportunity to influence the amount of CO₂ in the atmosphere. This can be achieved by maintaining existing soil carbon stocks (of particular importance in soils with high SOC content), or by soil carbon sequestration.



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Soil organic matter (SOM) comprises a complex and continuous mixture of partially decomposed organic substances derived from plant litter, as well as faunal and microbial biomass.⁸ As such, SOM plays a crucial role in many soil functions and ecosystem services such as buffering against climate change, supporting food production, regulating water availability, and more. Changes in the quality and/or quantity of SOM affects the capacity of soils to perform these ecosystem services and needs careful management. SOM is composed of roughly 58% carbon⁹ which corresponds to SOC and is influenced by microbial activity, accessibility of organic residues to microbes, various site conditions and management practices. Managing SOC through sustainable agricultural and land use practices has become a widely acknowledged strategy to restore healthy soil properties to combat land degradation and desertification, and enhance the resilience of agro-ecosystems to environmental shocks.¹⁰

SOC pools differ, however, based on their biochemical stability (i.e. labile, recalcitrant and inert), decomposition rate (i.e. fast-active, slow-intermediate and very slow/passive/inert) and turnover time (i.e.

1 FAO and ITPS. 2015. Status of the World's Soil Resources (SWSR) – Technical Summary. Food and Agriculture Organization of the United Nations and Intergovernmental Technical Panel on Soils, Rome, Italy

2 Scharlemann et al. 2014. Global soil carbon: understanding and managing the largest terrestrial carbon pool. <http://www.tandfonline.com/doi/abs/10.4155/cmt.13.77>

3 Lal. 2013. Soil carbon management and climate change. <http://dx.doi.org/10.4155/cmt.13.31>

4 Le Quéré, C., et al. 2016. Global Carbon Budget 2016. *Earth Syst. Sci. Data*, 8(2): 605–649.

5 IPCC. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge and New York (2014).

6 Lal. 2013. Soil carbon management and climate change. <http://dx.doi.org/10.4155/cmt.13.31>

7 Le Quéré, C., et al. 2016. Global Carbon Budget 2016. *Earth Syst. Sci. Data*, 8(2): 605–649.

8 Totsche, K.U., Rennert, T., Gerzabek, M.H., Kögel-Knabner, I., Smalla, K., Spiteller, M., Vogel, H.-J., 2010. Biogeochemical interfaces in soil: the interdisciplinary challenge for soil science. *J. Plant Nutr. Soil Sci.* 173, 88–99

9 Pribyl. 2010. A critical review of the conventional SOC to SOM conversion factor. <http://dx.doi.org/10.1016/j.geoderma.2010.02.003>

10 UNCCD-SPI. 2015. Pivotal Soil Carbon. Science-Policy Brief 01. http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/2015_PolicyBrief_SPI_ENG.pdf

short, long, very long).¹¹ When considering the effect of land management practices on SOC levels, therefore, the study of SOC stabilization (i.e. carbon associated with recalcitrant, very slow, passive and inert fractions) and destabilization (i.e. carbon associated with fast-active, and labile fractions) mechanisms are essential to determine the true effect on GHG emissions and SOC sequestration.¹²

The 2015 Status of the World's Soil Resources report¹³ highlights that more carbon resides in soil than in the atmosphere and all plant life combined. However, roughly 33% of the world's soils are degraded, which has led to large losses of SOC. Soils from various global agroecosystems (i.e. croplands, grazing lands, rangelands, peatlands, etc.) have lost 25–75% of their original SOC pool, depending on climate, soil type, and historic management.¹⁴

This amounts to 42 to 78 Gt of carbon, of which 18 - 28 Gt have been lost through desertification. These losses provide an opportunity: the recoverable carbon reserve capacity of the world's agricultural and degraded soils is estimated to be between 21 to 51 Gt of carbon. As such, SOC is included in the monitoring of SDG indicator 15.3.1, under which carbon stocks above and below ground is one of three sub-indicators to determine the proportion of land that is degraded over total land area. Addressing the increasing trends in soil and land degradation is a core challenge for sustainable development since degradation processes have adverse impacts on ecosystem services provided by soils, especially food security, water quality and availability, human health, and social and economic activities. Slowing or stopping soil degradation is a key factor in sustainable land management and mitigating desertification, land degradation and the impacts from drought.

The reversal of soil degradation through the build-up of SOM and the sustainable management of land and soils offers large potential to improve the performance of agriculture and forestry in climate change adaptation and mitigation as reported in the climate change assessments¹⁵ and in national greenhouse gas inventories. This should be accompanied by action to reduce further soil carbon losses by addressing the drivers of degradation.

The role of soils and SOC in the climate system and in the context of climate change adaptation and mitigation has been widely recognized and validated in various studies, both experimentally and through modelling.¹⁶ However, large-scale baseline and trend assessments are still inaccurate and many of the factors determining SOC quality and quantity in different parts of the world, as affected by climate change and measures to enhance SOC, are insufficiently investigated.¹⁷



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11 Uta Stockmann, Mark A. Adams, John W. Crawford, Damien J. Field, Nilusha Henakaarchchi, Meaghan Jenkins, Budiman Minasny, Alex B. McBratney, Vivien de Remy de Courcelles, Kanika Singh, Ichsani Wheeler, Lynette Abbott, Denis A. Angers, Jeffrey Baldock, Michael Bird, Philip C. Brookes, Claire Chenu, Julie D. Jastrow, Rattan Lal, Johannes Lehmann, Anthony G. O'Donnell, William J. Parton, David Whitehead, Michael Zimmermann. 2013. The knowns, known unknowns and unknowns of sequestration of soil organic carbon. *Agriculture, Ecosystems and Environment*. 164, 80–99.

12 Susan E. Trumbore and Claudia I. Czimczik. 2008. An Uncertain Future for Soil Carbon. *Science*. 10, 1126.

13 FAO and ITPS. 2015. Status of the World's Soil Resources (SWSR) – Technical Summary. Food and Agriculture Organization of the United Nations and Intergovernmental Technical Panel on Soils, Rome, Italy

14 Lal, 2013. Soil carbon management and climate change. <http://dx.doi.org/10.4155/cmt.13.31>;

15 Smith et al. 2014. Chapter 11: Agriculture, Forestry and Other Land Use (AFOLU). In *Climate Change 2014: Mitigation*, Edenhofer et al (Eds). Cambridge University Press: Cambridge, UK, 2014.

16 Lal, 2013. Soil carbon management and climate change. <http://dx.doi.org/10.4155/cmt.13.31>;

Frelüh-Larsen et al. 2014. Soil carbon management for climate change mitigation and adaptation: framing and integrating the issue in the evolving policy environment. http://ifsa.boku.ac.at/cms/fileadmin/Proceeding2014/WS_3_1_Frelüh-Larsen.pdf

Scharlemann et al. 2014. Global soil carbon: understanding and managing the largest terrestrial carbon pool. <http://www.tandfonline.com/doi/abs/10.4155/cmt.13.77>;

UNCCD-SPI. 2015. Pivotal Soil Carbon. Science-Policy Brief 01. http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/2015_PolicyBrief_SPI_ENG.pdf

17 Scharlemann et al. 2014. Global soil carbon: understanding and managing the largest terrestrial carbon pool. <http://www.tandfonline.com/doi/abs/10.4155/cmt.13.77>



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Guidelines for the assessment of SOC and stock changes in the context of GHG emissions have been developed by the Intergovernmental Panel on Climate Change (IPCC).¹⁸ However, reporting on the status and trends of SOC based on measurements is a challenging task which needs to be tackled through harmonized methodologies, the use of standardized sampling and modeling techniques, harnessing innovative solutions to data collection and sharing, and considering different field practices implemented by farmers at different scales. Initiatives aimed at improving information on the status of SOC can constitute a unique option to reinforce the current IPCC assessments and for reporting to the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention to Combat Desertification (UNCCD) and SDG 15.3.

The Global Soil Partnership (GSP) and members of the Food and Agriculture Organization (FAO) of the United Nations are currently working on the establishment of the Global Soil Information System as a tool for countries to regularly monitor the national soil condition. At the same time, in contribution to the sustainable development goal (SDG) indicator 15.3.1, the GSP is developing a Global Soil Organic Carbon (GSOC) map for finalization by December 2017.

The GSOC map will be compiled from national SOC maps that are being developed by member countries according to agreed product specifications and which will be shared with the Global Soil Information System.

These initiatives could provide valuable information to support the IPCC Sixth Assessment Report (AR6) and its products by contributing to the Methodology Report(s) to refine the 2006 IPCC Guidelines for National Greenhouse Gas Inventories as decided by the 44th Session of the IPCC (Decision IPCC/XLIV-L.3).¹⁹

During the 5th Working Session of the Intergovernmental Technical Panel on Soils (ITPS) of the Global Soil Partnership (GSP), the ITPS focused on establishing collaboration with the IPCC, UNCCD-SPI²⁰ and IPBES²¹. Within this context, the ITPS and the Acting Secretary of the IPCC discussed the importance of SOC in the climate change debate, with the Acting Secretary expressing the view that soils are currently only indirectly addressed in the IPCC assessment reports (ARs) and that it would be desirable to incorporate the topic of SOC in the IPCC ARs, from AR6 onwards.²² AR6 will be finalized in time for the first UNFCCC global stock take when countries will review progress towards their goal of keeping global warming below 2°C.

The ITPS and the Acting Secretary of the IPCC, supported by FAO, agreed to explore the option of a jointly organized Global Symposium on Soil Organic Carbon during the first quarter of 2017 as a common platform to discuss and elaborate the latest information on the role of soil and SOC in the climate change agenda. The UNCCD and its Science-Policy Interface (SPI) and the World Meteorological Organization (WMO) agreed to co-sponsor GSOC17 in light of the important contribution that maintaining and enhancing SOC can make to meeting the objectives of land degradation neutrality, reducing GHG emissions, and enhancing climate change adaptation.

19 IPCC. 2016. Sixth Assessment Report (AR6) Products. Outline of the Methodology Report(s) to refine the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. https://www.ipcc.ch/meetings/session44/l3_adopted_outline_methodology_report_guideline.pdf

20 UNCCD-SPI = Science-Policy Interface (SPI) of the United Nations Convention to Combat Desertification (UNCCD)

21 IPBES = Intergovernmental Platform on Biodiversity and Ecosystem Services

22 FAO, ITPS. 2016. Report of the Fifth Working Session of the Intergovernmental Technical Panel on Soils. <http://www.fao.org/3/a-bl137e.pdf>

18 IPCC. 2006. IPCC Guidelines for National Greenhouse Gas Inventories Volume 4 Agriculture, Forestry and Other Land Use

AIM AND OBJECTIVES

The overall **aim** of the symposium is to review the **role of soils and SOC** in the **context of climate change** and sustainable development and build scientific evidence that could be **assessed in the regular IPCC Assessment Reports**, starting with the AR6 report and other reports to be produced during the 6th assessment cycle, as well as reporting to UNFCCC, UNCCD and on the SDGs.

Specifically, the symposium outcomes should provide crucial information that could contribute to:

- the refinement of methodologies for reporting on SOC as outlined in Volume 4 (Agriculture, Forestry and other Land Use) of the *Outline of the Methodology Report(s) to refine the 2006 IPCC Guidelines for National Greenhouse Gas Inventories* which was adopted by decision IPCC-XLIV/L.3 during the 44th Session of the IPCC;
- the Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security and Greenhouse Gas Fluxes in Terrestrial Ecosystems (SR2) agreed during the 43rd Session of the IPCC; and
- the Land Degradation Neutrality Target Setting Programme implemented by UNCCD.

The specific objectives of the symposium are to:

1. Examine the current scientific and technical understanding of the role of soils and SOC in the climate system for carbon sequestration and climate adaptation;
2. Review the potential and limitations of SOC management to contribute to climate change mitigation and adaptation, addressing land degradation, and meeting the sustainable development goals;
3. Review current knowledge on land and soil management impacts on SOC (and SOC stabilization and destabilization mechanisms), including identification of practices that increase SOC;
4. Enable and strengthen the provision of knowledge on SOC measurement, modeling and management, and the interlinkages with land degradation and climate change to inform upcoming IPCC assessment reports and reports to initiatives addressing land degradation;

5. Identify knowledge gaps and explore opportunities for collaborative research;
6. Identify policy options for relevant soil and SOC priorities to encourage the adoption of practices that enhance SOC sequestration and stabilization under national climate change agendas.

EXPECTED OUTPUT

The **symposium output** will be a scientific document highlighting the role of soils and SOC management in meeting the climate change and sustainable development agendas that could be assessed by IPCC in its regular reports, starting with SR2, the refinement of the inventory guidelines, and AR6, as well as reporting to UNFCCC, UNCCD and the SDGs. The document will present an overview of the state-of-the-art in SOC monitoring and reporting, measures to maintain and enhance SOC, and recommendations for managing SOC in agroecosystems of special interest (carbon rich soils, grasslands and livestock production systems, and drylands). The ITPS, UNCCD-SPI and WMO will offer to present the workshop output to the IPCC for consideration by its AR6 Scoping Meeting scheduled for early May 2017.

SYMPOSIUM STRUCTURE

The Symposium will be a scientific meeting, held over three (3) days at FAO Headquarters in Rome, Italy from 21-23 March 2017 with **300-500 participants** representing all regions of the world.



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The meeting will open with plenary addresses by representatives of the hosting organizations, presenting the policy context, relevance of SOC and outcomes sought from the symposium:

- IPCC Presentation: Key findings of the AR5 on agriculture, soil and SOC; expectations/needs for SR2, refinement of the inventory guidelines, and AR6;
- ITPS Presentation: Key aspects of soils and SOC to be considered in regular IPCC assessments;
- SPI presentation: Importance of soil and increasing SOC in achieving Land Degradation Neutrality (LDN).

Keynote presentations will be given by invited leading SOC experts in relation to the following main themes (the themes are further elaborated under Item 6):

- **Theme 1:** Measuring, mapping, monitoring and reporting SOC;
- **Theme 2:** Maintaining and/or increasing SOC stocks (fostering SOC sequestration) for climate change mitigation and adaptation, and Land Degradation Neutrality;
- **Theme 3:** Managing SOC in soils with a) high SOC-peatlands, permafrost, and black soils²³ b) grasslands, and livestock production systems and c) in dryland soils.

PARALLEL SESSIONS

will be held per the above three themes, to be organized by session conveners. The format of the parallel sessions will be determined by the conveners (in close collaboration with the organizing and scientific advisory committees) to ensure the themes are sufficiently presented and discussed to compile the main outcomes and key aspects that could be assessed by IPCC in its regular reports, starting with SR2 and AR6, the revision of the 2006 IPCC guidelines for national GHG inventories, and the implementation of LDN.

ABSTRACTS AND PAPERS

for key topics (as identified by the organizing and scientific advisory committees) will be invited to support the above themes and incorporate case studies from different countries. Guidelines for the preparation of abstracts and papers will be provided.

23 Black soils are broadly defined as all soils containing a mollic horizon.



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PARTICIPANTS

will include representatives from FAO member states, UNCCD country Parties, organizing institutions, relevant Panels, presenters whose abstracts are accepted and scientists and practitioners working in related fields.

SYMPOSIUM COMMITTEES

The following Committees will be established:

ORGANIZING COMMITTEE:

Comprised of representatives from each of the co-organizing bodies (FAO/GSP/ITPS, IPCC, UNCCD-SPI and WMO). It will oversee the overall organization of the Symposium, guide the formats of the parallel sessions, and oversee the finalization of the Symposium outcomes.

SCIENTIFIC COMMITTEE:

Comprised of representatives from the relevant panels, as well as additional leading experts in the four main themes. The Committee is responsible for evaluating submitted abstracts and papers, as well as ensuring the scientific quality of the parallel sessions and Symposium outcomes.

SYMPOSIUM THEMES AND KEY QUESTIONS TO BE ADDRESSED

Based on the listed objectives, the symposium will focus on three major themes to collate relevant information as elaborated below. In order to address

the objectives, the main questions to be addressed during the symposium are listed under each theme.



THEME 1: MEASURING, MAPPING, MONITORING AND REPORTING SOC

National monitoring and reporting of SOC is becoming increasingly important in fulfillment of global Conventions and initiatives. For example, under the IPCC, national SOC stocks and stock changes are assessed annually in relation to GHG emissions according to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.²⁴ However, these Guidelines need to be updated²⁵ to provide a sound scientific basis for future international climate action, especially under the Paris Agreement²⁶ (which will come into effect in 2020). The IPCC will therefore produce a Methodology Report by 2019 as supplement (not full revision) to be used in conjunction with the 2006 IPCC Guidelines. This Report will 1) provide supplementary methodologies for GHG sources and sinks to fill information gaps and incorporate new technologies and information, 2) provide updated default values of emission factors and 3) provide additional or alternative up-to-date information and guidance as clarification of the existing Guidelines.²⁷ Under the Agriculture, Forestry and Other Land Use (AFOLU) section the Methodology Report will address the following issues in terms of changes in soil carbon stocks:²⁸

- Update reference carbon stocks in soils;
- Develop new guidance for the Tier 2 methodology for mineral soils that requires less activity data than the current default method;
- Elaborate the Tier 3 methodologies with case study examples for soils.

24 IPCC. 2016. Sixth Assessment Report (AR6) Products. Outline of the Methodology Report(s) to refine the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. https://www.ipcc.ch/meetings/session44/l3_adopted_outline_methodology_report_guideline.pdf

25 <https://www.ipcc.ch/>

26 United Nations. 2015. Paris Agreement. Available online at http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

27 IPCC (2016). Report of IPCC Scoping Meeting for a Methodology Report(s) to refine the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Eds: Ngarize, S., Kranjc, A., Baasansuren, J., and Shermanau, P. Report of the IPCC Scoping Meeting. Pub. IGES, Japan.

28 IPCC. 2016. Sixth Assessment Report (AR6) Products. Outline of the Methodology Report(s) to refine the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

With the development of the SDGs, SOC has the potential to be a globally relevant and feasible indicator to monitor trends of land and soil degradation since SOC stock is related to many fundamental soil functions, it serves as an important indicator of soil health and it is at the nexus of many soil-derived ecosystem services.²⁹ Under SDG 15.3.1 specifically, carbon stocks above and below ground is listed as sub-indicator to measure the spatial extent of degraded land as percentage of total land area.³⁰ As a step in developing a global product for SDG 15.3.1, the GSP/ITPS is developing a global soil organic carbon map which will be compiled from nationally produced SOC stock maps. This approach is implemented within the framework of the Global Soil Information System under the GSP using SOC stock calculations and reporting scales based on the 2006 IPCC Guidelines.³¹ However, considering that SOC stock is an indirect parameter to measure land and soil degradation, several associated challenges would need to be addressed such as 1) the limited readily available datasets on SOC stock at national and regional levels, 2) the uncertainties associated with the suitability of existing data for monitoring SOC stock changes, and 3) insufficient quantitative evidence linking SOC stock changes to the various land and soil degradation drivers and processes.³²



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29 Lorenz, K. and Lal, R. 2016. Soil Organic Carbon – An Appropriate Indicator to Monitor Trends of Land and Soil Degradation within the SDG Framework? TEXTE 77/2016. Project No. 55337 Report No. 002413/ENG. Umweltbundesamt, Germany. Available at: <http://www.umweltbundesamt.de/publikationen>

30 <http://www.unccd.int/Lists/SiteDocumentLibrary/Rio+20/LDN%202016/UNCCD%2015.3.1%20metadata%2004%20March%202016.pdf>

31 GSP/ITPS. 2016. GSP Guidelines for sharing national data/information to compile a Global Soil Organic Carbon (GSOC) map. Available online at <http://www.fao.org/3/a-bp164e.pdf>

32 Lorenz, K. and Lal, R. 2016. Soil Organic Carbon – An Appropriate Indicator to Monitor Trends of Land and Soil Degradation within the SDG Framework? TEXTE 77/2016. Project No. 55337 Report No. 002413/ENG. Umweltbundesamt, Germany. Available at: <http://www.umweltbundesamt.de/publikationen>



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THEME 2:
MAINTAINING AND/OR INCREASING
SOC STOCKS (FOSTERING
SOC SEQUESTRATION) FOR
CLIMATE CHANGE MITIGATION
AND ADAPTATION, AND LAND
DEGRADATION NEUTRALITY

A further point of consideration within the context of SOC monitoring is the measuring, reporting and verification (MRV) which is aimed at tracking countries' progress in terms of climate change mitigation.³³ This includes all measures taken by states to collect data on emissions, mitigation actions and support. However, the MRV term is used very broadly and there is often no clear reference to the type of MRV needed, used or discussed. This often leads to confusion since the underlying nature of MRV-related activities differs according to their context and application. The main types of MRV related to SOC focuses on GHG emissions rather than SOC stocks per se. This begs the question whether specific MRV guidelines are necessary to assess SOC stocks and stock changes in relation to not only climate change, but also land degradation related reporting.

KEY QUESTIONS:

1. What are the latest and reliable reference values for soil carbon stocks, and stock change factors based on country- or region-specific data for the most important land uses to be updated in the 2006 IPCC Guidelines?
2. What are the recent developments in reliable methods and models to quantify SOC stocks and stock changes and how can these be best applied for SOC measurement and monitoring?
3. How can the uncertainties of SOC stock and stock change estimates be reduced?
4. Should specific MRV guidelines be developed to track SOC stocks and stock changes and if yes, what are the main methodological considerations?

33 UNFCCC, 2014. Handbook on Measurement, Reporting and Verification for developing countries, Bonn: s.n.

Maintaining and increasing SOC stocks is critical not only to reduce GHG emissions and remove CO₂ from the atmosphere, but also to harness the benefits of increased SOC (and SOM) in the soil in terms of soil health and fertility and increasing its water holding capacity. Even though soils host the largest terrestrial carbon pool,³⁴ soil degradation, land use and land use change has resulted in soils having lost 25-75% of their original organic carbon pools.³⁵ Further SOC losses need to be prevented to maintain existing levels, especially in high-carbon soils, while the potential to restore SOC stocks to at least part of its former levels through carbon sequestration needs to be harnessed.

This session will bring together leading scientists and experts to discuss scientific evidence to determine the i) global potential to maintain and/or sequester SOC and the associated levels of uncertainty of achieving this potential, ii) upper limits to SOC sequestration potential (saturation levels), iii) SOC quality and long-term stability and the associated sustainability of SOC sequestration, iv) benefits of SOC sequestration for climate change adaptation and mitigation and for achieving LDN, and v) policy considerations to support or promote SOC sequestration.

KEY QUESTIONS:

1. What is the global potential to achieve SOC sequestration across land uses and what is the level of uncertainty associated with achieving this?
2. What are the upper limits (potential saturation levels) to SOC sequestration potential?
3. What is the long-term stability of SOC and its components and what is the long-term sustainability of SOC sequestration?

34 Scharlemann et al. 2014. Global soil carbon: understanding and managing the largest terrestrial carbon pool. <http://www.tandfonline.com/doi/abs/10.4155/cmt.13.77>

35 Lal, 2013. Soil carbon management and climate change. <http://dx.doi.org/10.4155/cmt.13.31>;

4. Is there sufficient scientific evidence to establish whether SOC sequestration contributes to climate change adaptation, mitigation and achieving LDN?
5. How can policies support the adoption of practices that foster SOC sequestration and how can scientific evidence be packaged to inform such policies?



THEME 3:
MANAGING SOC IN SOILS
A) WITH HIGH SOC - PEATLANDS, PERMAFROST, AND BLACK SOILS
B) GRASSLANDS, AND LIVESTOCK PRODUCTION SYSTEMS AND C) IN DRYLAND SOILS.

A well-documented aspect of SOC management to maintain and/or increase SOC stocks is the site-specific nature of potential SOC stock changes as affected by, amongst others, climate, landscape, soil type, land use, land use change and soil management practices. This Theme will be addressed in three parallel sub-themes to discuss the context of maintaining and/or increasing SOC stocks under specific soil or land use conditions. Discussions will focus on scientific evidence in support of i) prioritizing soils to be conserved to maintain existing SOC stocks, ii) the potential to sequester SOC as a function of local soil and climate conditions, degradation status and land use (i.e. theoretical versus realistic SOC sequestration potential and the degradation threshold where SOC sequestration is no longer feasible), iii) potential derived ecosystem services and co-benefits of SOC sequestration, and iv) proven management practices that prevent SOC losses and foster long-term SOC sequestration.

a) Soils with high SOC – peatlands, permafrost and black soils

When considering the maintenance of existing SOC levels, soils with inherently high organic carbon content (such as peatlands, permafrost soils and so-called black soils which are broadly defined as *all soils containing a mollic horizon*³⁶) are especially important in the context of climate change. This is mainly

36 The International Network of Black Soils will be launched during GSOC17 under the auspices of the GSP to promote the conservation and ensure the long-term productivity of these soils through sustainable soil management.

due to their potential as source of carbon emissions (especially CO₂ and CH₄) despite the fact that these soils do not cover a large portion of the global land area (of the global land surface, peatlands cover roughly 3%³⁷ and black soils an estimated 7% of the ice-free land surface³⁸). Globally, peatlands alone are estimated to contain twice as much carbon as all the world's forests combined and four times as much as the atmosphere.

At the same time, many of these soils have inherently high productivity and fertility, have high relevance for food security and are therefore often extensively farmed. Within this context these soils also have significance as potential SOC sinks through improved management practices in areas where historical SOC losses have occurred. There is still significant uncertainty about the carbon stocks and flows within high SOC soils however, since their extent, status and dynamics have not been estimated and mapped with sufficient accuracy.

b) Soils in grasslands and livestock production systems

Grassland soils are considered to have substantial potential to sequester carbon through improved grassland management practices or rehabilitating degraded grasslands. At the same time such practices often enhance productivity and tend to enhance



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37 Joosten, H., Tapio-Biström, M.-L., Tol, S. (2012): Peatlands - guidance for climate change mitigation by conservation, rehabilitation and sustainable use. Mitigation of climate change in agriculture Series 5. FAO and Wetlands International, Rome. 114 p.

38 Liu, X., Lee Burras, C., S. Kravchenko, Y., Duran, A., & Huffman, T. (2012). Overview of Mollisols in the world: distribution, land use and management. Canadian Journal of Soil Science.

the resilience of grasslands to climate variability. However, grassland carbon sequestration faces a number of challenges such as slower rates of sequestration compared to forestry and agricultural sequestration, difficulty in measuring changes in SOC stocks, costs of implementation are not well quantified and scientific information to inform policy analysis is less complete. At the same time, the opportunities to benefit from grassland practices that sequester carbon can be greater in grasslands since large populations of people depend directly on grasslands, but are often poor and vulnerable to climate variability and climate change. Implementing practices that increase grassland SOC stocks could thus lead to considerable mitigation, adaptation and development benefits.³⁹

Livestock production systems occupies about two thirds of the world's agricultural land for the production of animal feed (grazed pastures, 80% and feed crops, 20%), with a quarter of the crop area being used to produce animal feed. With the global demand for livestock products expected to double by 2050, especially in developing countries, it is becoming increasingly important to improve forage-based systems that contribute to climate change adaptation and reduce carbon emissions associated with livestock production.⁴⁰

c) Dryland soils – soils of arid, semi-arid and sub-humid areas

Drylands are characterized by generally low average rainfall (where rainfall is less than the potential moisture losses through evaporation and transpiration) and covers about 47% of the earth's land surface. Drylands are therefore often associated with a lack of water which severely constrains plant productivity and thus affects SOC accumulation in

soils.⁴¹ Nonetheless, dryland soils contain more than a quarter of the global organic carbon stores.⁴²

Dryland soils are especially vulnerable to land degradation and desertification and associated SOC losses since SOC storage decreases with increasing temperature and decreasing soil water content. In fact, SOC pools are estimated to decrease exponentially with increases in temperature. As a result, dryland soils contain low SOC stocks and the factors that influence SOC sequestration such as climate, soil type, vegetation cover and management practices are especially important when developing SOC management strategies and practices for these soils.⁴³

KEY QUESTIONS FOR EACH OF THE THREE SUB-THEMES:

1. Where are the priority areas for soil conservation to prevent SOC losses and what are the associated policy requirements to regulate their sustainable management?
2. What are the realistically achievable SOC stock changes and rates of change for specific soils and land uses?
3. What is the degradation threshold where soil restoration and SOC sequestration is no longer considered feasible?
4. What are the potential derived ecosystem services and co-benefits of SOC sequestration that would contribute to climate change adaptation and reducing land degradation?
5. What are the proven best management practices that prevent SOC losses and foster SOC sequestration?

39 Conant, RT (2010). Challenges and opportunities for carbon sequestration in grassland systems. A technical report on grassland management and climate change mitigation. Prepared for the FAO. Integrated Crop Management Vol. 9-2010.

40 Gaitán L., Läderach P., Graefe S., Rao I., and Van der Hoek R. 2016. Climate-Smart Livestock Systems: An Assessment of Carbon Stocks and GHG Emissions in Nicaragua. PLoS ONE 11(12): e0167949. doi:10.1371/journal.pone.0167949

41 Peeyush Sharma, Vikas Abrol, Shrdha Abrol and Ravinder Kumar (2012). Climate Change and Carbon Sequestration in Dryland Soils, Resource Management for Sustainable Agriculture, Dr. Vikas Abrol (Ed.), InTech, DOI: 10.5772/52103. Available from: <http://www.intechopen.com/books/resource-management-for-sustainable-agriculture/climate-change-and-carbon-sequestration-in-dryland-soils>

42 UNCCD-SPI. 2015. Pivotal Soil Carbon. Science-Policy Brief 01. http://www.unccd.int/Lists/SiteDocumentLibrary/Publications/2015_PolicyBrief_SPI_ENG.pdf

43 Peeyush Sharma, Vikas Abrol, Shrdha Abrol and Ravinder Kumar (2012). Climate Change and Carbon Sequestration in Dryland Soils, Resource Management for Sustainable Agriculture, Dr. Vikas Abrol (Ed.), InTech, DOI: 10.5772/52103. Available from: <http://www.intechopen.com/books/resource-management-for-sustainable-agriculture/climate-change-and-carbon-sequestration-in-dryland-soils>



**GSOC17
AGENDA**

TUESDAY 21ST MARCH - 08:30 - 16:20

Time	Title
08:30 - 10:00	Registration
10:00 - 11:30	<p>OPENING OF THE SYMPOSIUM RED ROOM (A121)</p> <ul style="list-style-type: none"> • Mr. José Graziano Da Silva, Director-General of FAO • H.E. Jioji Konousi Konrote, President of the Republic of Fiji • Mr. Kamernu Vella, EU Commissioner for Environment (Video message) • Ms. Monique Barbut, Executive Secretary UNCCD • Mr. Abdalah Mokssit, IPCC Secretary • Mr. Stéphane Le Foll, French Minister for Agriculture, AgriFood and Forestry (Video message) • Ms. Elena Manaenkova, Deputy-Secretary General WMO (Video message) <p>Launch of the GSOC17 Video</p>
11:30 - 11:45	INTRODUCTION TO THE GSOC17 Themes and work modalities
11:45 - 13:00	<p>PLENARY 1 RED ROOM (A121) setting the scientific scene for GSOC17</p> <ul style="list-style-type: none"> • Key aspects of soils and Soil Organic Carbon (SOC) and their contributions to mitigating and adapting to climate change. • Key findings of the AR5 on agriculture, soil and SOC; plans and progress with SR2, refinement of the inventory guidelines, and AR6. • SOC as indicator of progress towards achieving Land Degradation Neutrality (LDN) • Soil organic carbon and the IPBES land degradation and restoration assessment
13:00 - 14:00	SIDE EVENT Launch of the International Network of Black Soils Iran Ro
14:00 - 16:00	<p>PLENARY 2 RED ROOM (A121)</p> <p>UNFCCC Keynote address</p> <p>Keynote presentations, setting the challenges of GSOC17 themes</p> <ul style="list-style-type: none"> • Soil organic carbon sequestration: importance and State-of-the-Science • Quantifying global soil carbon losses in response to warming • Climate Smart Agriculture and forest conservation to foster SOC sequestration and reduce land degradation • Estimating SOC changes: is it feasible? • Status and challenges for mapping, monitoring and MRV of global SOC
16:00 - 16:20	COFFEE BREAK

Moderators/Presenters

Moderator: Ms. Maria Helena Semedo,
Climate and Natural Resources (DDN),
Deputy Director-General, FAO

Moderator: Mr. Castro Rene,
Climate, Biodiversity, Land and Water Department (CB),
Assistant Director-General, FAO

Moderator: Mr. Eduardo Mansur, FAO

Mr. Luca Montanarella, Chair of ITPS

Ms. Jo House, IPCC

Mr. Barron Orr, UNCCD-SPI
Ms. Anne Larigauderie, Executive Secretary of IPBES

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Moderator: Mr. Victor Castillo, UNCCD
Ms. Patricia Espinosa, UNFCCC Executive Secretary

Mr. Rattan Lal, Carbon Management and Sequestration Center, USA
Mr. Thomas Crowther, Netherlands Institute of Ecology
Mr. Johan Six, Swiss Federal Institute of Technology, Switzerland

Ms. Eleanor Milne, Colorado State University, USA
Mr. Martial Bernoux, FAO, Italy



<p>16:20 - 17:30</p>	<p>Parallel Sessions</p>	
	<p>THEME 1 Monitoring, mapping, measuring, reporting and verification (MRV) of SOC - IRAQ ROOM (A235)</p> <p>Theme Chair: Ms. Liesl Wiese, FAO, Italy</p> <p>Moderator: Ms. Maria de Lourdes Mendonça, EMBRAPA, Brazil</p> <ol style="list-style-type: none"> 1. Global Soil Organic Carbon map. Rainer Baritz, FAO, Italy 2. Can global soil organic carbon maps be used in policy decisions on practical agricultural management? Mats Söderström, CIAT, Kenya 3. Global space-time soil organic carbon assessment. José Padarian Campusano, Sydney Institute of Agriculture, University of Sydney, Australia 4. A high-resolution spatially-explicit methodology to assess global soil organic carbon restoration potential. Fleskens Luuk, Soil Physics and Land Management Group, Wageningen University, The Netherlands 	<p>THEME 2 Maintaining and/or increasing SOC stocks for climate change mitigation and adaptation and Land Degradation Neutrality - RED ROOM (A121)</p> <p>Theme Chair: Mr. Joris de Vente, UNCCD-SPI</p> <p>Moderator: Mr. Robert Stefanski, WMO</p> <ol style="list-style-type: none"> 1. Global management of soil organic matter. Mr. Miguel Taboada, INTA, Argentina 2. Sustainable land management to mitigate and adapt to climate change. Ms. María José Sanz Sánchez, Basque Centre for Climate Change, Spain 3. Land management impact on soil organic carbon stocks – what do we really know? Mr. Axel Don, Thünen Institute of Climate-Smart Agriculture, Germany 4. Enhancing SOC sequestration: myth or reality in Africa? Mr. Rolf Sommer, CIAT, Kenya
<p>17:30 - 18:00</p>	<p>Theme discussion moderated by the Theme Chair</p>	<p>Theme discussion moderated by the Theme Chair</p>
<p>18:00 - 19:30</p>	<p>COCKTAIL Launch of the publication “Soil organic carbon - The hidden potential”</p>	

THEME 3

Managing SOC in:

Theme Chair: Ms. Claire Chenu, INRA, France

SUB-THEME 3.1

Soils with high SOC - peatlands, permafrost, and black soils - MEXICO ROOM (D211)

Moderator: Mr. Guiqing Han,
HAAS, China

1. Managing SOC in the black soils of Russia. Mr. Ivan Vasenev, Timiryazev Academy, Russian Federation
2. Soil organic carbon pools in the northern circumpolar permafrost region. Mr. Scott Smith, Agriculture and Agrifood Canada, Canada
3. Peat soil carbon monitoring and management in Indonesia. Mr. Fahmuddin Agus, Indonesian Soil Research Institute, Indonesia

SUB-THEME 3.2

Grasslands, and livestock production systems - PHILIPPINES ROOM (C281)

Moderator: Mr. Sergio Zelaya,
FAO, Italy

1. Carbon sequestration in Irish grasslands. Mr. Rogier Schulte, Wageningen University, The Netherlands
2. Accounting for soil carbon stock changes in grasslands and rangelands: proposal for a tiered-approach and preliminary recommendations of the LEAP Partnership. Mr. Aaron Simmons, Orange Agricultural Institute, Australia
3. Carbon Sequestration Potential of the Ecoregion Savannas (flatlands) of Venezuela. Mr. Juan Antonio Comerma, IDECYT, Venezuela
4. C sequestration of a grazed permanent grasslands: uses of complementary methods for data analyses and interpretation. Ms. Katja Klumpp, INRA, France

SUB-THEME 3.3

Dryland soils - ETHIOPIA ROOM (C285)

Moderator:

Ms. Botle Mapeshoane,
National University of Lesotho,
Lesotho

1. Challenges of soil organic carbon sequestration in drylands. Mr. Rachid Mousadek, INRA, Morocco
2. Soil Inorganic Carbon and Climate Change in drylands? An emerging issue? Ms. Tiphaine Chevallier, IRD
3. Effect of deforestation and management on soil carbon stocks in the South American Chaco. Ms. Rosa Carina Alvarez, CONICET, Argentina
4. Protection of soil from the loss of organic carbon by taking into account erosion and managing land use at varying soil type: indication from a model semiarid area. Mr. Sergio Saia, Italy Council for Agricultural Research and Economics, Italy.

Theme discussion moderated
by the Theme Chair

Theme discussion moderated
by the Session Moderator

Theme discussion moderated
by the Session Moderator

08:30 - 10:30

THEME 1
IRAQ ROOM (A235)

Moderator: Mr. Jean-Luc Chotte, IRD-UNCCD-SPI, France

1. 4 per 1000 soil carbon sequestration. Mr. Budiman Minasmy, University of Sydney, Australia
2. Status of soil organic carbon stocks in the Small Island Developing States (ISDS). Mr. Siosuia Halavatu, Secretariat of Pacific States, Fiji
3. Methodology for the measurement and monitoring of SOC stock under sustainable land/forest management in the transboundary ecosystem of the Grand Chaco Sudamericano. Mr. Matías Bosio, PASCHACO, Argentina
4. Soil carbon models for carbon stock estimation – where do we fail? Mr. Aleksi Lehtonen, Natural Resources Institute Finland, Finland
5. Measuring and monitoring the impact of agricultural management on soil carbon stocks from point to continental scale in Australia. Mr. Jeff Baldock, CSIRO, Australia
6. Development of a soil organic carbon baseline for Otjozondjupa, Namibia. Mr. Nijbroek Ravic, CIAT, Kenya
7. Calculating changes in soil organic carbon in Japanese agricultural land by IPCC-Tier 3 modeling approach: use of modified Rothamsted carbon model. Mr. Yasuhito Shirato, Institute for Agro-Environmental Sciences, Japan
8. Towards a Tier 3 approach to estimate SOC stocks at sub-regional scale in Southern Italy. Ms. Roberta Farina, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Italy

THEME 2
RED ROOM (A121)

Moderator: Ms. Annette Cowie, UNCCD-SPI, Australia

1. The new Global soil erosion assessment: a contribution to quantify erosion effect on global carbon budget. Mr. Pasquale Borrelli, Joint Research Centre, Italy
2. Combining SOC sequestration and food security in African soils. Ms. Yacine Badiane Ndour, Institut Senegalais de Recherches Agricoles, Senegal
3. Assessing the potential of soil organic carbon sequestration in African soils. Ms. Tantely Razafimbelo, University of Antananarivo and CASA, Madagascar
4. Deep ploughing mineral soils for SOC sequestration. Ms. Viridiana Alcantara, FAO, Italy
5. Land use changes on soil carbon dynamics, stocks in eastern Himalayas, India. Mr. Brajendra Parmar, Indian Institute of Rice Research, India
6. Effects of land use/land cover on aggregate fractions, aggregate stability, and aggregate associated organic carbon in a montane ecosystem. Mr. Tshering Dorji, Ministry of Agriculture and Forest, Bhutan
7. Regenerative organic farm management practices mitigate agro-ecosystem vulnerability to climate change by sequestering carbon and building resilience. Ms. Kristine Nichols, Rodale Institute, USA

SUB-THEME 3.1

MEXICO ROOM (D211)

Moderator: Mr. Hamid Custovic, University of Sarajevo, Bosnia & Herzegovina

1. Distribution of tropical peatland types, their location and current degradation status, emissions. Ms. Alexandra Barthelmes, Greifswald University, Germany
2. An expert system model for mapping tropical wetlands and peatlands. Ms. Rosa Maria Roman-Cuesta, Center for International Forestry Research, Indonesia
3. Quantifying terrestrial ecosystem carbon stocks for future GHG mitigation, sustainable land-use planning and adaptation to climate change in the Québec province, Canada. Ms. Michelle Garneau, Université du Québec à Montréal, Canada
4. The potential of responsible peatland management to reduce global soil carbon loss and greenhouse gas emissions. Mr. Christopher D. Evans, Centre for Ecology and Hydrology, Bangor, UK
5. Peatland restoration in Russia for reduction of carbon losses and greenhouse gas emissions: the experience of large scale rewetting project. Mr. Andrey Sirin, Institute of Forest Science, Russian Academy of Sciences, Russian Federation
6. Re-wetting drained peatlands can potentially reduce large greenhouse gas emissions. Mr. Hongxing He, University of Gothenburg, Sweden
7. Effects of a raised water table on CO₂ and CH₄ soil emissions and celery yield from agricultural peat under climate warming conditions. Ms. Magdalena J. Matysek, University of Sheffield, UK
8. Evaluation of annual carbon losses due to "soil respiration". Ms. Olesya Siabruk, National Scientific Center ISSAR, Ukraine

THEME 3.2

PHILIPPINES ROOM (C281)

Moderator: Mr. Rainer Horn, Kiel University, Germany

1. Long-term effect of different agricultural soil use and management systems on the organic carbon content of Uruguay prairie soils. Mr. Fernando Garcia, University of Uruguay, Uruguay
2. Is it possible to mitigate greenhouse gas emissions from agricultural soil by introduction of temporary grassland into cropping cycles? Ms. Cornelia Rumpel, CNRS-INRA-ENS-Paris, France
3. Impact of land use and soil depth on soil organic carbon accumulation and other soil properties in Minna, southern Guinea Savanna of Nigeria. Mr. Uzoma O. Anthony, Federal University of Technology, Minna, Nigeria
4. Soil organic carbon stock changes under grazed grasslands in New Zealand. Mr. David Whitehead, University of Waikato, New Zealand
5. Sub-surface soil carbon stock affected by tree lines in an oxisol under integrated crop-livestock-forestry in the southern Amazon. Ms. Beata Eموke Madari, Brazilian Agricultural Research Corporation, Brazil
6. Land cover and land use change driven change of regional soil organic carbon storage in croplands and grasslands of Northeast Slovakia. Ms. Gabriela Barančíková, National Agricultural and Food Centre, Slovakia

SUB-THEME 3.3

ETHIOPIA ROOM (C285)

Moderator: Ms. Karma Dema Dorji, Ministry of Agriculture and Forest, Bhutan

1. National land degradation neutrality targets foster SOC Sequestration in Turkey. Mr. Keskin Hamza, Republic of Turkey Ministry of Forestry and Water Affairs, Turkey
2. Sequestering soil carbon in the low input farming systems of the semi-arid tropics – does litter quality matter? Mr. Anthony M. Whitbread, International Crops Research Institute for the Semi-Arid Tropics, India
3. Synergy in soil organic amendments production and use for carbon sequestration and sustainable drylands agriculture. Mr. Mansur Dawaki, Bayero University, Nigeria
4. Biochar to conserve carbon and nitrogen in an arid region soil of low native organic matter. Mr. Muhammad Riaz, Government College University Faisalabad, Pakistan
5. Efficacy of integrated straw formulations on lowland rice field organic carbon and greenhouse gas emissions using CCAFS-MOT Model in Niger State, Nigeria. Mr. Yawovi Séna Koglo, Kwame Nkrumah University of Science and Technology, Ghana
6. Integrated use of organic carbon, plant nutrients and bio-fertilizers is key to improve field crops productivity under arid and semiarid climates. Mr. Amanullah Khan, University of Agriculture, Pakistan
7. Carbon management and sequestration in dryland soils of Morocco: Nexus approach. Mr. Rachid Moussadek, INRA, Morocco

WEDNESDAY 22ND MARCH - 10:30 - 17:15

10:30 - 11:00	COFFEE BREAK	
11:00 - 13:00	<p>THEME 1 IRAQ ROOM (A235)</p> <p>Moderator: Ms. Rosa Cuevas, Red Labs, Mexico</p> <ol style="list-style-type: none"> 1. Update on Canada's contribution to the Global Soil Organic Carbon map. Mr. Bert VandenBygaart, Agriculture and Agri-Food Canada, Canada 2. National map of organic carbon in the soils and mantle of Mexico. Mr. Rodrigo Vargas, University of Delaware, USA 3. Turkey's National Geospatial Soil Fertility and Soil Organic Carbon Information System. Ms. Sevinç Madenoglu, Ministry of Food, Agriculture and Livestock, Turkey 4. Spatial assessments for the mapping and monitoring of soil organic carbon: Using stakeholder engagement processes. Ms. Leigh Ann Winowiecki, World Agroforestry Centre (ICRAF), Kenya 5. Spatial distribution of soil organic carbon stocks in Serbia. Ms. Dragana Vidojević, Environmental Protection Agency, Republic of Serbia 6. Soil organic carbon mapping and estimation of stock in rice soils of India. Mr. V. Ravindra Babu, ICAR, India 7. Estimation of reference soil organic carbon (SOC) for mineral soils of Colombia. Mr. Fredy Hernando Neira Mendez, LDN-Consultant, Colombia 8. Estimation of soil organic carbon stocks in the northeast Tibetan Plateau. Mr. Ganlin Zhang, Institute of Soil Science, Chinese Academy of Soil Science, China 	<p>THEME 2 RED ROOM (A121)</p> <p>Moderator: Ms. Anna Benedetti, CREA, Italy</p> <ol style="list-style-type: none"> 1. Significant offset of long-term potential soil carbon sequestration by nitrous oxide emissions in the EU. Mr. Emanuele Lugato, Joint Research Centre, Italy 2. Conservation agriculture, an option for carbon sequestration in soil. Case study in Guantánamo, Cuba. Ms. Marianela Cintra Arencibia, Institute of Soils - UCTB Guantánamo, Cuba 3. Factors limiting SOC sequestration by no-tillage in Mediterranean agroecosystems. Mr. Jorge Álvaro-Fuentes, Spanish National Research Council, Spain 4. Biochar as a strategy for sustainable land management and climate change mitigation. Ms. Annette Cowie, UNCCD-SPI, Australia 5. The effect of forest harvest on soil carbon: a global meta-analysis. Mr. Rob Harrison, University of Washington, USA 6. Dynamics of soil carbon sequestration under oil palm plantations of different age. Mr. Sebastian Wisdom Brahene, FAO Regional Office for Africa, Ghana 7. Urban soils as hotspots of anthropogenic carbon accumulation. Mr. Viacheslav Vasenev, RUDN University, Russian Federation 8. Soil organic carbon stabilization in compost amended soils. Mr. Riccardo Spaccini, Università di Napoli, Italy
13:00 - 14:15	SIDE EVENT World Water Day celebration 2017 Sheikh Zayed Center 	
14:15 - 16:00	POSTER SESSION Atrium COFFEE BREAK	
16:00 - 17:15	Theme discussion moderated by the Theme Chair	Theme discussion moderated by the Theme Chair

**SUB-THEME 3.1
MEXICO ROOM (D211)**

Moderator: Ms. Isaurinda Dos Santos, INIDA, Cape Verde

1. Diminishing peat oxidation of agricultural peat soils by infiltration via submerged drains. Mr. Jan J.H. van den Akker, Wageningen Environmental Research, The Netherlands
2. Water migration of soil organic carbon in soils and landscapes in humid forests of middle taiga (Arkhangelsk region, Russian Federation). Mr. German Kust, Lomonosov State University, Russian Federation
3. Managing of karst peatland use and potential rehabilitation in Dinaric Region. Mr. Hamid Custovic, University of Sarajevo, Bosnia and Herzegovina
4. Ukrainian chernozems as a factor in global food security and resilience of agriculture to climate change. Ms. Olesya Siabruk, National Scientific Center ISSAR, Ukraine
5. Organic matter of buried soils: evolution, structure, function. Mr. Serafim Chukov, Saint Petersburg State University, Russian Federation
6. Alarming loss of soil carbon stores due to intensive forestry measures in the boreal forest zone in Finland. Mr. Heikki Simola, Finnish Association for Nature Conservation, Finland

**THEME 1
PHILIPPINES ROOM (C281)**

Moderator: Mr. Pavel Krasilnikov, ECFS, Russian Federation

1. New measurement, mapping and modeling of SOC in Australia supports national carbon accounting and monitoring. Mr. Raphael Viscarra-Rossel, CSIRO, Australia
2. Monitoring, reporting, and verification of soil carbon sequestration on the cropland and grassland of Canada. Mr. Brian McConkey, Agriculture and Agri-Food Canada, Canada
3. Assessment, monitoring and managing soil organic carbon (SOC) for climate change mitigation and adaptation: An Indian perspective. Mr. Suresh K. Chaudhari, Indian Council of Agricultural Research, India
4. Overview of the Rapid Carbon Assessment Project: Design and Conterminous. Ms. Skye Wills, USDA, USA
5. Coupling high spatial resolution data, GIS approaches and modelling for reliable estimates of SOC stocks and their historical changes in agricultural lands. Mr. Ibrahim Khalil, UCD Earth Institute, University College Dublin, Ireland
6. Using Infrared Spectroscopy for detection of change in soil properties in selected land uses in Mt. Marsabit ecosystem, Northern Kenya. Ms. Caroline Ouko, CETRAD, Kenya
7. The performance of portable mid-infrared spectroscopy for the prediction of soil carbon. Mr. Martín Soriano-Disla, CSIRO Land and Water, Australia
8. Soil Spectral Libraries for monitoring and reporting on Sustainable Development Goal indicators in Northern Greece. Mr. George Zalidis, Aristotle University of Thessaloniki, Greece

**SUB-THEME 3.3
ETHIOPIA ROOM (C285)**

Moderator: Mr. Dan Pennock, University of Saskatchewan, Canada

1. Mapping of soil organic carbon stock in the Arab countries. Mr. Talal Darwish, National Council for Scientific Research, Lebanon
2. Spatial distribution of organic carbon in dryland soils: case of Tunisian continental oasis Guettaya-Kebili. Mr. Nadhem Brahim, Faculty of Sciences of Tunis, Tunisia
3. Soil organic carbon: A key factor of sustainable agriculture in Iran. Mr. Farhad Moshiri, Agricultural Research, Education and Extension Organization, Iran
4. Rehabilitating degraded croplands for improved crop productivity and soil carbon sequestration on smallholder farms in Zimbabwe. Mr. Hatirarami Nezomba, Soil Fertility Consortium for Southern Africa, Zimbabwe

LIGHT REFRESHMENTS

Theme discussion moderated by the Theme Chair

Theme discussion moderated by the Session Moderator

Theme discussion moderated by the Session Moderator

THURSDAY 23RD MARCH

08:30 - 10:30	Work groups per theme to develop scientific, policy and advocacy messages for the Outcome Document. Moderated by the Theme Chairs		
	THEME 1 IRAQ ROOM (A235)	THEME 2 RED ROOM (A121)	THEME 3 ETHIOPIA ROOM (C285)
10:30 - 11:00	COFFEE BREAK		
11:00 - 13:00	Continuation	Continuation	Continuation
13:00 - 14:00	LUNCH		
	PLENARY 3 - RED ROOM (A121)		
14:00 - 14:40	Unlocking the potential of SOC for climate action, food security and sustainable development - a feasible future - Mr. Pete Smith, Aberdeen University, UK		Moderator: Mr. Eduardo Mansur, Director Land and Water Division, FAO
14:40 - 15:30	Presentation by Theme Chairs to provide a summary of the main session outcomes and key messages per main theme to be reported in the Outcome Document “Unlocking the potential of SOC”		
15:30 - 16:50	Interactive Panel: <ul style="list-style-type: none"> • H.E. François Pythoud, Permanent Representative of Switzerland to FAO, IFAD and WFP • Ms. Margarita Astrálaga, Director Environment and Climate Division, IFAD • Mr. Patrick Heffer, International Fertilizer Association • Ms. Josiane Masson, European Commission • Mr. Evangelos Koumentakos, World Farmers Organization • Ms. Betsy Taylor, Breakthrough Strategies & Solutions • Mr. Yaya Adisa Olaitan Olaniran, Permanent Representative of the Federal Republic of Nigeria to FAO 		
16:50 - 17:10	Conclusions and way forward (beyond GSOC17) <ul style="list-style-type: none"> • Mr. Ronald Vargas, Land and Water Division, FAO 		
17:10 - 17:20	Closure of the Symposium by Mr. René Castro Salazar, Climate, Biodiversity, Land and Water Department (CB), Assistant Director-General, FAO		



**GSOC17
POSTER
SESSIONS**



POSTER SESSION - THEME 1

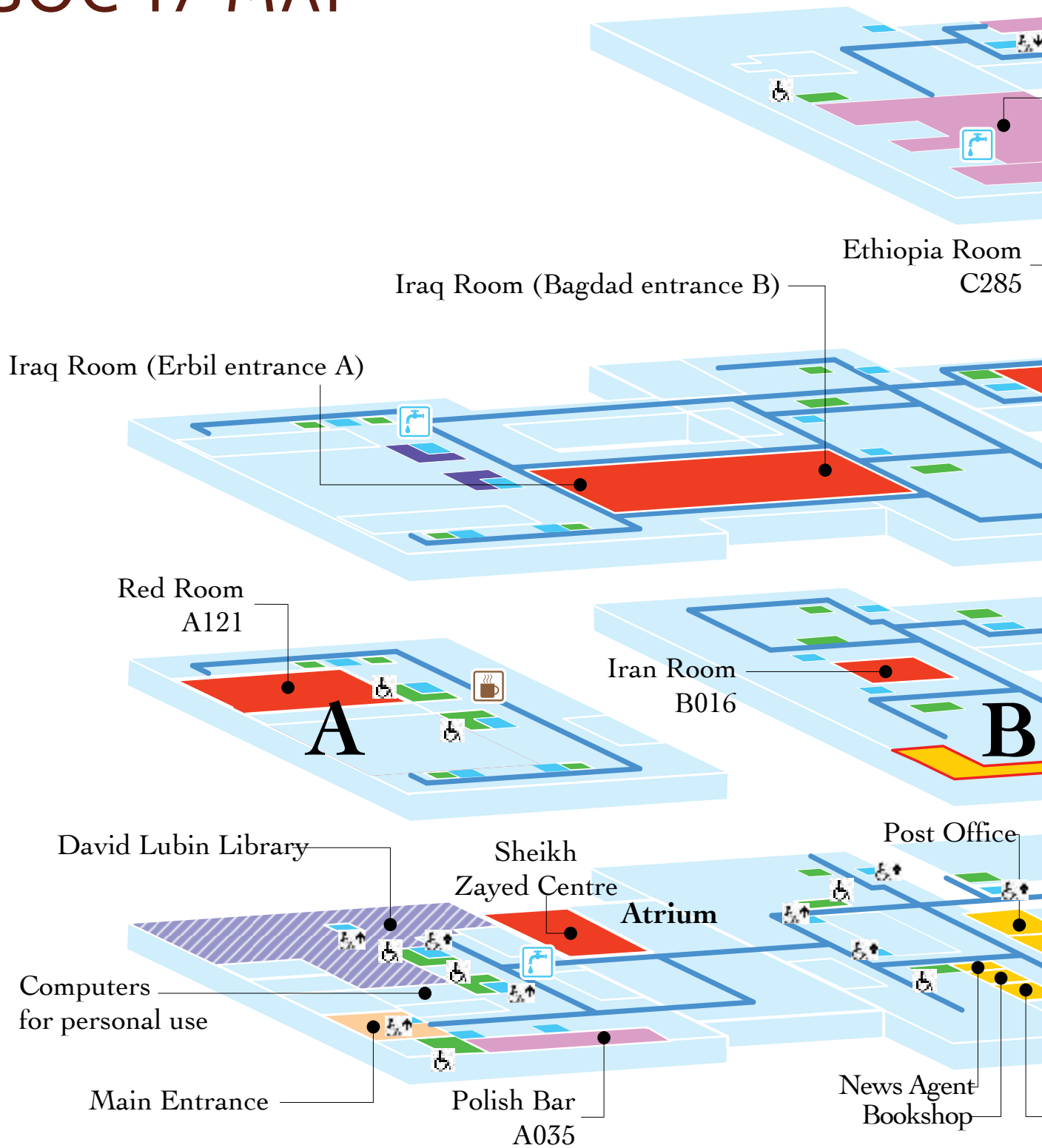
1. **Arrouays, Dominique** - GlobalSoilMap for soil organic carbon mapping and as a basis for global modeling
2. **Astover, Alar** - Estimation of soil organic carbon stock in Estonian agricultural land from plot to national scale
3. **Benslama, Mohammed** - Carbon dynamics in soils of wetlands in northeastern Algeria
4. **Chen, Janet** - Integrated monitoring of carbon storage and loss through emerging isotope technology
5. **Comeau, Louis-Pierre** - Soil organic matter derived CO₂; Comparison of partition methods from an Acric Umbrisol in a subtropical forest
6. **D'acqui, Luigi P.** - Low-temperature ashing (LTA) approach for assessing the physically protected organic matter in soil aggregates
7. **Diagne, Papa Nékhrou** - The effect of the continuum removal in measuring soil organic carbon with near infrared spectroscopy (NIRS) in the Senegal sahelian soils
8. **Golubeva, Olga** - Application of the FAO EX-ACT tool for carbon balance accounting in the agroecosystems of Tajikistan
9. **Hays, Dirk B.** - Developing ground penetrating radar (GPR) for enhanced root and soil organic carbon imaging: optimizing root derived carbon sequestration, crop adaptation and agro-ecosystem services
10. **Lee, Chang Hoon** - Prediction for the changes of soil organic carbon under climatic change scenario by using DeNitrificationDeComposition (DNDC) model
11. **Leu, Andre** - The 4 per 1000 initiative - Increasing soil organic carbon to mitigate climate change
12. **Muhaimeed, Ahmed S.** - Using remote sensing and GIS techniques for predicting soil organic carbon in southern Iraq
13. **Nkongolo, Nsalambi** - Quantification of soil carbon in Ituri Forest, Democratic Republic of the Congo
14. **Obi, Chinedu** - Ecological stoichiometry along urban-rural land-use gradients in southeastern Nigeria
15. **Priori, Simone** - Field scale mapping of soil carbon stock with limited sampling by the use of proximal sensors
16. **Sonnenschein, Leonard** - Using ecosystem based analysis systems and novel organic tracers to measure, monitor and map SOC
17. **Srisomkiew, Sasirin** - Correlation between soil organic carbon and land use, slope class and soil texture in Chaing Rai Province of Thailand
18. **Vinci, Ialina Charlotte** - Strengths and weaknesses of a bottom up approach in estimating soil organic carbon: an experience in the varied Italian scenery
19. **Villarino, Sebastián Horacio** - Towards realistic and feasible soil organic carbon inventories: a case of study in the Argentinean semiarid Chaco









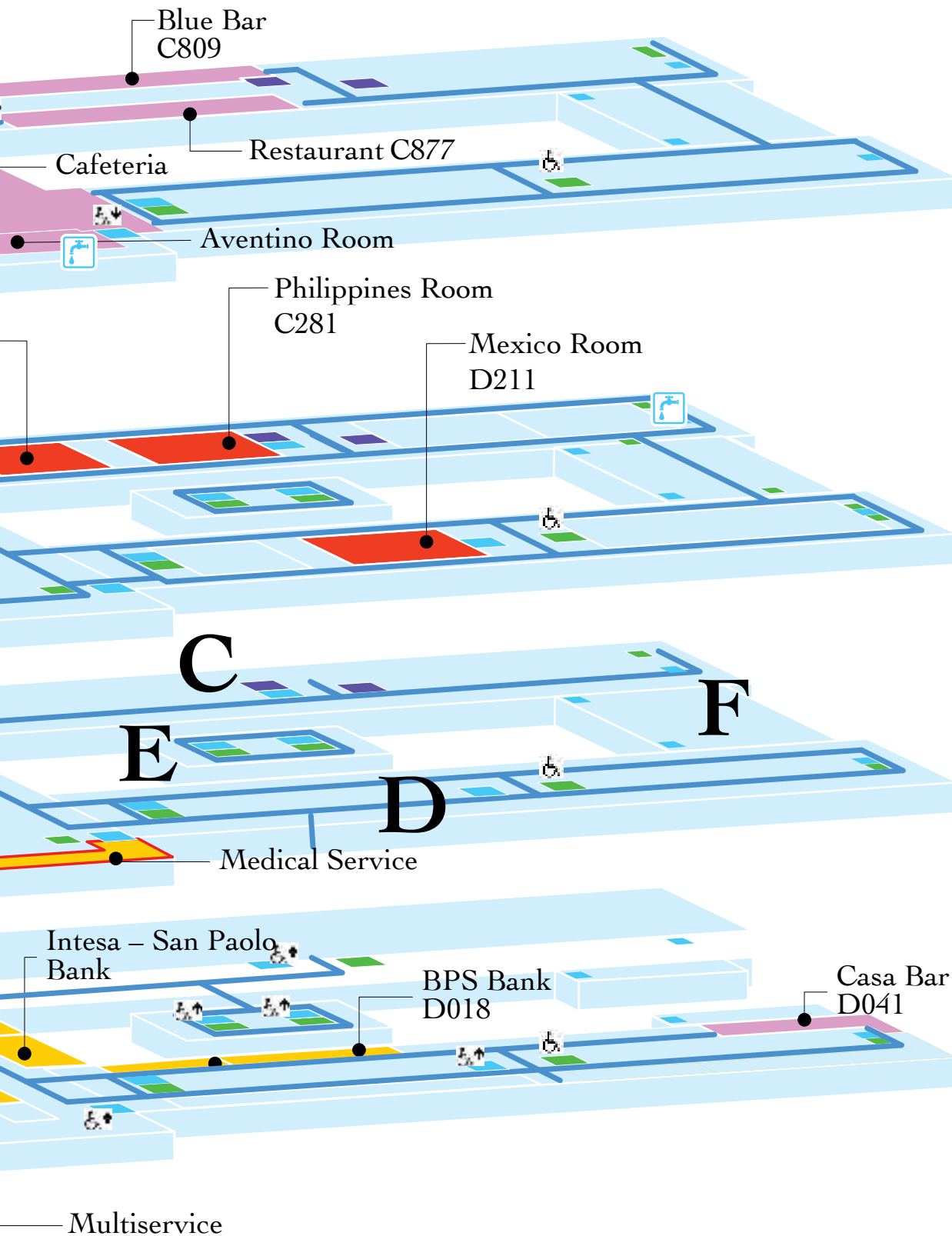
POSTER SESSION – THEME 2

1. **Bhattacharyya, Ranjan** - Long-term fertilization impacts on temperature sensitivity of soil organic carbon decomposition under wheat based cropping systems
2. **Chenu, Claire** - Agricultural practices that store organic carbon in soils: is it only a matter of inputs?
3. **Costantini, Eduardo** - Soil organic carbon in Mediterranean cropping systems and the influence of climate change on soil physical qualities
4. **De Vente, Joris** - Losses and redistribution of organic carbon by erosion in fragile agricultural and restored catchments
5. **De Vente, Joris** - The potential of reducing tillage frequency and incorporating plant residues as a strategy for climate change mitigation in semiarid Mediterranean agroecosystems
6. **Goreau, Thomas J. F.** - Regenerative development to reverse climate change: quantity and quality of soil carbon sequestration control rates of CO₂ and climate stabilization at safe levels
7. **Idowu, Mary Kemi** - Influence of nitrogen fertilizer application on organic carbon content of underutilized vegetable grown soils in southwestern Nigeria
8. **Kokhia, Mzia** - Soil macrofauna and their role in soil remediation
9. **L'abate, Giovanni** - SOC sequestration in a 4 years conventional and conservative rotation
10. **Santillan Vinisa Saynao** - Enhancement on estimates of organic carbon in mexican soils
11. **Mordhorst, Anneka** - Investigations on carbon–structure-relations in aggregated soils subjected to different tillage intensity
12. **Muscolo, Adele** - Effects of different thinning intensities on soil carbon storage in *Pinus laricio* forest (Apennine south Italy)
13. **Narayanan, Aadhi** - Increasing soil organic carbon and enhancing soil moisture holding capacity through tank silt application to adapt climate change
14. **Oluwa, Olufemi Ayanfe** - Carbon sequestration by an accelerated compost in an Alfisol
15. **Pascual, Alberto** - Family coffee farmers improve mountain soils
16. **Saidou, Addam Kiari** - Organic carbon in an agroforestry park, mixing Acacia trees and cowpea crops, in N'Dounda, Niger
17. **Sanden, Taru** - Agricultural long-term field experiments as a basis to monitor soil organic carbon
18. **Shedakar, Vinayak Shamrao** - A novel approach for on-farm assessment, prediction and management of SOC
19. **Spaccini, Riccardo** - LIFE CarbOnFarm project: technologies to stabilize soil organic carbon and farm productivity, promote waste value and climate change mitigation
20. **Xu, Minggang** - Manure application increased grain yield and soil organic carbon across China's agricultural land
21. **Milla Ruben** - Ecological intensification increases soil carbon stocks via changes in crop residue traits?
22. **Dorji, Karma Dema** – LDN - a way forward to enhance SOC storage to mitigate land degradation and climate change - Bhutan

GSOC 17 MAP



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|---|----------------------|---|------------|---|-------------------|
|  | GSOC17 Meeting Rooms |  | Facilities |  | Disabled WC |
|  | Bar / Cafeteria |  | WC |  | WC with Grab bars |



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Lifts



Water Fountains



Corridors



Disabled Lifts



Drink Dispenser

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