THE OHIO STATE UNIVERSITY

# Carbon Management and Sequestration Center

Issue 1 | 2017

## The Past, Present and Prospects of C-MASC

The event on 31st March 2017 organized in Kottman Hall was an excellent opportunity to recapture the historic evolution of C-MASC and consider the futuristic trends. Included in the photo (left to right) are Dr. Jerry Ladman (former Assoc. Prov. Office of Intl. Affairs), Dr. David Hansen (former director, Intl. Programs in Agric.), Dr. Bobby Moser (former Dean of FAES, and Vice Pres. of Agric. Admin.), Dr. Caroline Whitacre (Sr. Vice President Office of Research), Ms. Kate Bartter (Director, Office of Energy and the Environment), Prof. Rattan Lal (Director, C-MASC), Ms. Virginia Lopez Prada and Ms. Young Wu (Elsevier Publishing), Dr. Casey Hoy (Faculty Director, InFACT), and Dr. Jeff Sharp (Director, SENR). *Continued on Page 2...*

## Inside this Issue:



Visiting Scholar, Dr. Cristina Chinchilla Soto receiving a certificate from Drs. Erbaugh and Lal, after completing 3-months of research at C-MASC under the Borlaug Fellowship.

# C-MASC Group

The C-MASC team met on 29th March to attend the weekly seminar, presented by Dr. Gulab Singh Yadav, and present the diploma to Dr. Cristina Chinchilla Soto. Dr. Soto was at C-MASC for 3 months with the award of Borlaug Fellowship. Dr. Mark Erbaugh (Director, IPA), Beau Ingle (Coordinator of the fellowship program of IPA) and Dr. Umair Talib (University of Agriculture, Faisalabad) also attended the farewell reception.

Present in the photo (left to right) are: Gulab Singh Yadav, Rattan Lal, Laura Conover, Ram Swaroop Meena, Qingqing Cao, David Ussiri, Nall Moonilall,Steven Doyle, Ellen Maas, Chloe Turner, Beau Ingle, Cristina Chinchilla Soto, Atif Javed, Mark Erbaugh, Safdar Hussain, Klaus Lorenz, Jose Guzman, Henry Peller, Tarik Mitran, Umair Talib, Shuangyi Li, and Jayanta Layek. *C-MASC team not present in the photo are: Basant Rimal, Qingbiao Wu, Eric Stein, Chris Eidson and Jose Álvarez Puente.*

## Historic Evolution of C-MASC

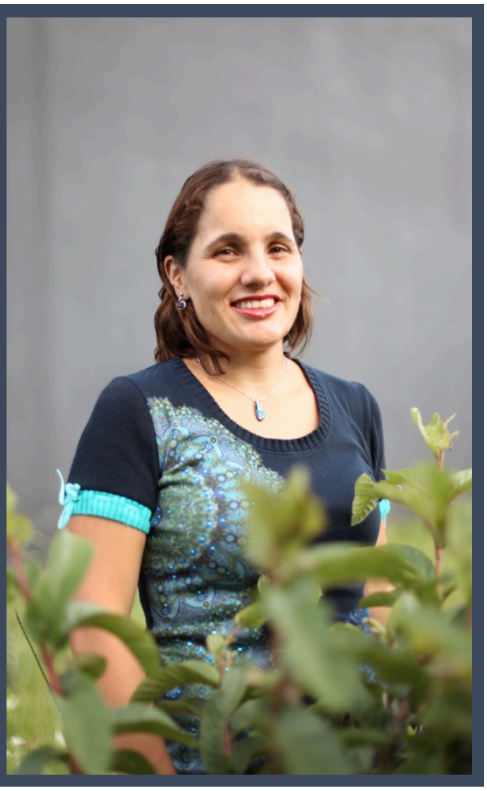
*(...Continued from Page 1)*

| Year | Title | Funding Source | Personnel/Institution |
|---|---|---|---|
| 1988 | Soil Carbon | US-EPA | Woods Hole |
| 1992-2007 | Soil and Climate Change | USDA-NRCS | Horrace Smith, John Kimble, Ron Follet |
| 1997 | USDA-NRCS/Kyoto Treaty | NRCS | Robert Rominger |
| 2000 | CAGMGS | USDA | Consortium |
| 2000-2003 | Mine Soil | DOE | OCDO |
| 2000-2002 | CCERI | OR | Brad Moore, Keith Alley (Lal, Thompson, Hatcher, Shum) |
| 2000 | C-MASC | OIA/OARDC | B. Moser, S. Slack, G. Mullins, D. Hansen |
| 2000-2010 | C-MASC | Sir Dorab Ji Tata Trust | Dick Celeste, Ratan Tata, M.S.Swaminathan |
| 2001-2003 | CIRIT | OIA | Jerry Ladman |
| 2003-2006 | Regional Partnership | USDOE | Battelle |
| 2003-2006 | Terrestrial C Sequestration | NETL | Battelle |
| 2006-2010 | Climate Water Carbon | TIE | B. Schneider, Robert McGrath, B. Moser, J. Bigham, |
| 2010-2016 | C-MASC | CS-CAP | USDA-NIFA |
| 2017 | C-MASC | | Drs. Sharp, Whitacre, McPheron, Erbaugh, Hoy, Bartter |

# Visiting Scholars: New

## Dr. Cristina Chinchilla Soto

the University of Costa Rica (UCR)
San Jose, Costa Rica



I am Cristina Chinchilla Soto and I am currently a visiting scholar from the University of Costa Rica (UCR), located in San Jose, Costa Rica. At UCR, I'm a researcher at the Environmental Pollution Research Center (CICA), as well as a Lecturer at the School of Agronomy. I have a B.Sc. in Agronomy and M.Sc. in Agricultural Sciences and Natural Resources with an emphasis on soil sciences from the University of Costa Rica. In 2014, I graduated with my Ph.D. in Atmospheric and Environmental Sciences from the University of Edinburgh. I joined the C-MASC on January 9th 2017 thanks to the support of a Bourlag International Agricultural Science and Technology Fellowship of the USDA.

My research interests span from leaf ecophysiology (how plants respond to their environment) to greenhouse gases, especially nitrous oxide produced by nitrogen fertilization. I am particularly interested in the soil-plant continuum and how the management of these components impact future climate change. The specific research I am carrying out at the C-MASC is trying to address how fertilization management might affect soil organic carbon storage in the short-term, and how soil carbon sequestration impacts soil health. This is important, as soil carbon is the key element of climate smart strategies that are currently being evaluated as part of Costa Rica's country level strategy to become carbon neutral country by 2021. Additionally, soil organic carbon quantity and quality have a direct impact on improving crop productivity, which is critical to enhancing the livelihoods of Costa Rican farmers. Acquired knowledge from my research will be applied and transferred through further research and graduate student theses, and it will also be disseminated to my students during lectures at UCR.

## Safdar Hussain

Ph.D. Scholar
Department of Agronomy
University of Agriculture, Faisalabad
Pakistan

I am Ph.D. scholar from Department of Agronomy, University of Agriculture, Faisalabad-Pakistan. I did my BSc (Hons.) and MSc (Hons.) in Agronomy from the University of Agriculture Faisalabad-Pakistan. I have been selected for the International research support initiative programme (IRSIP) for the year 2016-17 by the higher education commission of Pakistan (HEC) for a period of Six months. I have joined the C-MASC for IRSIP on 29th of December, 2016 to work on "Assessing the role of crop residues on C sequestration and mitigation of greenhouse gases emissions".

My research in Pakistan focuses on sustaining the soil health and productivity of rice-wheat cropping system using different crop residue mulches, conservation agriculture and ecological management of weeds in rice-wheat cropping system of Punjab-Pakistan. I hope I can understand the carbon and nitrogen dynamics in soil and conservation agriculture.

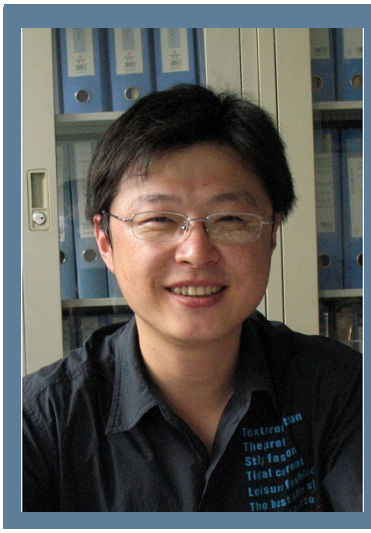
# Visiting Scholars: New

## Dr. Tarik Mitran

National Remote sensing Centre
Indian Space Research Organization
Hyderabad, India

Dr. Tarik Mitran, Scientist/Engineer-"SC", National Remote sensing Centre, Indian Space Research Organization, Hyderabad, India has been awarded prestigious "SERB-INDO-US Post-Doctoral Fellowship award-2016 under board area of Research" Atmospheric and Earth Science" and specific area of "Science of Climate Change" funded by Science and Engineering Research in partnership with the bi-national Indo-US Science and Technology Forum, India Joined to Carbon Management Sequestration Centre on January, 2017. He is working on the topic "Assessing spatial pattern of carbon sequestration potential of selective soils of India through Geospatial technology and Modelling approach".

He did his Ph.D. in Agricultural Chemistry and Soil Science during 2012 from Bidhan Chandra Krishi Viswavidalaya, West Bengal, India with Prestigious "Maulna Azad National Fellowship" funded by University Grant Commission, India for productivity improvement in poor and remote areas of Coastal Sundarbans of India. He has been awarded best poster presentation award twice by Indian Society of Soil Science and qualified National Eligibility Test in Soil science twice conducted by Indian Council of Agricultural Research. He has also received University Merit Scholarship, Junior/Senior Research fellowship during his studies. He has published 15 articles in reputed peer reviewed journals; 2 book chapter, 14 conference paper as well as number of technical bulletins and popular articles. Recently he has been promoted to next scale as Scientist/Engineer-"SD" by Indian Space Research Organization for his significant contribution on soil and land resources assessment using remote sensing and GIS technologies. He is actively involved as a Principle Investigator/ Co-Principle Investigator in various National, Operational as well as technology development project at National Remote Sensing Centre, ISRO, India. His current areas of research is Soil Carbon assessment, Soil $CO_2$ efflux assessment and its role in climate change, Soil Fertility and Spatial mapping, Predictive Soil Mapping, Hyperspectral Remote Sensing of soils, Land Degradation Assessment using Remote Sensing, Soil Erosion Modelling and C transport, Land use Land cover Assessment using Remote sensing. He is also act as a reviewer for various peer reviewed journals and member for scientific societies. Dr. Mitran is greatly thankful to SERB & IUSSTF of India for funding his work and CMSC, The Ohio State University, USA for all kind of support and facilities.



## Dr. Shuangyi Li

Shenyang Agricultural University,
Shenyang, Liaoning, China

Dr. Shuangyi Li, is a Visiting Scholar from Shenyang Agricultural University, China. He received his Ph.D in Soil Science and is a lecturer in the College of Land and Environment. His main research field focus on soil organic carbon and soil structure stability. He joined C-MASC in January 2017 for a one-year research period.

# Visiting Scholars: New

## Atif Javed

PhD Scholar
Institute of Soil and Environmental Sciences
University of Agriculture, Faisalabad, Pakistan

I am a PhD student at Institute of Soil and Environmental Sciences, University of Agriculture, Faisalabad, Pakistan with specialization in soil physics. I completed my BS and MS degrees in soil science from same university in 2011 and 2013 respectively. I worked on improving water use efficiency in wheat through different irrigation schedules during my MS. I also worked as a research fellow in a Higher Education Commission (HEC) Pakistan funded research project titled "A soil health initiative for agricultural and environmental sustainability in Pakistan" from 2014-2016. I joined Carbon Management and Sequestration Center (C-MASC), Ohio State University (OSU) on March 13, 2017 as a visiting scholar to work with Prof. Dr. Rattan Lal. I highly acknowledge Higher Education Commission (HEC) Pakistan and C-MASC, OSU for providing me this opportunity.

My research interests include improving water and nitrogen use efficiencies in maize-wheat system, modelling water, carbon and nitrogen dynamics under different management practices and improving soil health for sustainable crop production.

## Dr. Somanagouda Patil

International Center for Agricultural Research in the Dry Area (ICARDA)
B.P. 6299, Rabat-Institutes
Rabat 10112, Morocco

Dr. Somanagouda B. Patil, Indian citizen working in the International Center for Agricultural Research in the Dry Areas (ICARDA) as an Agronomist based at Rabat, Morocco,has joined C-MASC as a visiting scholar for 3 months from 3rd April to 30th June 2017. He received Bachelor of Science in Agriculture from University of Agricultural Sciences (UAS), Dharwad; Master of Science in Agronomy from UAS-Bangalore and PhD in Agronomy from UAS-Dharwad and sandwich program with ICRISAT-India. He has been awarded the 2016 Borlaug International Agricultural Science and Technology Fellowship Program sponsored by United States Department of Agriculture (USDA). During the fellowship program, he will conduct research on climate smart agriculture practices which impact soil respiration components and soil carbon stability.

His research interests are crop diversification and conservation agriculture, carbon sequestration and climate change, integrated crop management, soil health management, evaluation of improved breeding lines and agronomic packages for legumes/cereals. At ICARDA, he is involved in the projects like CRP-Grain Legumes, CRP-Wheat, FAO-CA, ICARDA-CAAS, ICARDA-ICAR and Food Security in Arab countries. He has over 100 publications including research and review articles in reputed journals, book chapters, conference papers, extension bulletins and popular articles. He has supervised three master students' from Moroccan and Indian Universities and three interns from Tunisian and Jordan Institutes. He received two gold medals from UAS-Dharwad for achieving first rank in the university, and received research scholarship from ICRISAT-India for PhD research program.

# C-MASC Alumni: Melissa Herman

## Melissa Herman

Agricultural Director
The Reckoning International

Melissa studied with the CMASC lab, earning her BS in 2009 and her MS in 2011. She now serves as the Agricultural Director at The Reckoning International, teaching soil management to farmers in Kenya and Uganda, East Africa. In the last two years, she and two national staff worked in 16 communities and impacted over 1,200 farmers. Working to bridge the gap between the scientific and farming communities, she uses simple stories and analogies to teach soil management principles in a way that the farmers can understand, using words that can be easily translated. Melissa visited the CMASC group in February and gave a presentation about her work. While many organizations working with majority world farmers focus on teaching improved management techniques, Melissa stressed the importance of teaching the farmers the basic principles of soil management, thereby empowering the farmers to make their own better management decisions. She has found that oftentimes the simplest lessons prove to be the most profound, such as the importance of pulling weeds and understanding that you cannot take more nutrients out of the soil than what you put in.

Find out more about the Reckoning International here.

Photographed (left) is graduate students Eric Stein and Steven Doyle with Melissa Herman after her seminar at C-MASC. Eric did research on carbon sinks of Mount Kilmanjaro at the Sokoine University of Agriculture (SUA), Tanzania. Steven will also conduct research at SUA, sponsored by the International Programs in Agriculture and plans to join this summer.

# C-MASC Alumni: Anup Das

## Dr. Anup Das

ICAR Research Complex for NEH Region
Umiam, Meghalaya, India

Dr. Anup Das from Dharmanagar, North Tripura is presently serving as Principal Scientist and Head, Division of Crop Production, ICAR Research Complex for NEH Region, Umiam, Meghalaya, India. During the past 14 years of service, he has done innovative and pioneering research in the field of conservation agriculture (CA), organic farming (OF) and climate resilient agriculture (CRA); developed package of practices for no-till production of pulses and oilseeds in rice and maize fallow, organic production packages of 11 important crops on cropping system basis, site-specific land-use and watershed based farming systems. Modified system of rice intensification, assessment of biochar on soil health, modifying land configurations for enhancing cropping intensity and water productivity are his other research contributions. His interventions could reduce the soil loss by 50-90%, enhanced productivity by 15-30% and doubled cropping intensity, farmers' income enhanced by Rs. 15,000-20,000 and employment increased by 50-65 man days/households. His dedicated service to the farmers' can be assessed from developing water harvesting capacity of 187 million litre through 265 farm ponds and 937 agri- film lined *Jalkunds* and creating irrigation facilities for about 146 ha. Another 438 diverse rain water structures were created for multiple livelihood opportunities under NAIP-3. The identified technologies were disseminated in a participatory and convergence approach benefiting about 15000 farmers. Dr. Das has guided and co-guided 17 masters and one Ph.D. student and published 94 research papers, 13 books and many other documents.

Recognizing his contributions to Natural resource management in the field of agricultural sciences, Dr. Anup Das has been awarded with following two prestigious awards during 2016-17:

- Dr. HK Jain-CAU Award 2013-14 for excellence in research in agriculture in northeastern states of India on 10 November, 2016 by Central Agricultural University, Imphal, India
- Dr. KG Tejwani Award for biennium 2014-2015 by Indian Association of Soil and Water Conservationists in recognition of his outstanding contributions to Natural Resource Management on 09 Feb, 2017


Receiving Dr. HK Jain-CAU Award 2013-14 from Honourable Union Minster of Agriculture & Farmers' Welfare, Govt. of India Shri. Radha Mohan Singh in presence of Dr. M Premjit Singh, Honourable Vice Chancellor, CAU, Imphal & Dr. KM Bujarbaruah, Honourable Vice Chancellor, AAU, Jorhat, Assam, India

Receiving Dr. KG Tejwani Award for biennium 2014-2015 from Honourable Chief Minister of Assam **Shri. Sarbananda Sonowal** in presence of Dr. KM Bujarbaruah, Honourable Vice Chancellor, AAU, Jorhat, Assam, India and Dr. PK Mishra, Director, ICAR-Indian Institute of Soil and Water Conservation, Dehradun, India

# C-MASC Alumni: Eduane de Padua


## Dr. Eduane de Padua

the Federal University of Lavras
Lavras, Brazil

Eduane de Padua (above, center), a former visiting scholar at C-MASC (2015-2016), completed his Ph.D in Soil Science by the Federal University of Lavras (UFLA). His thesis defended on 23rd February was titled "Soil Organic Carbon and Nitrogen in Soils of South of Minas Gerais State-Brazil: The Effect Of Altitude", supervised by Dr. Yuri Lopes Zinn (above, second from left). The objectives of this work were to evaluate the effect of altitude on the SOC and N in tropical mountain forests of Minas Gerais State, to quantify SOC and total N stocks up to 1-m deep, and to examine the relation of the SOC and total N with different attributes of the soils.

***Congratulations from C-MASC!***

UFLA
UNIVERSIDADE FEDERAL DE LAVRAS

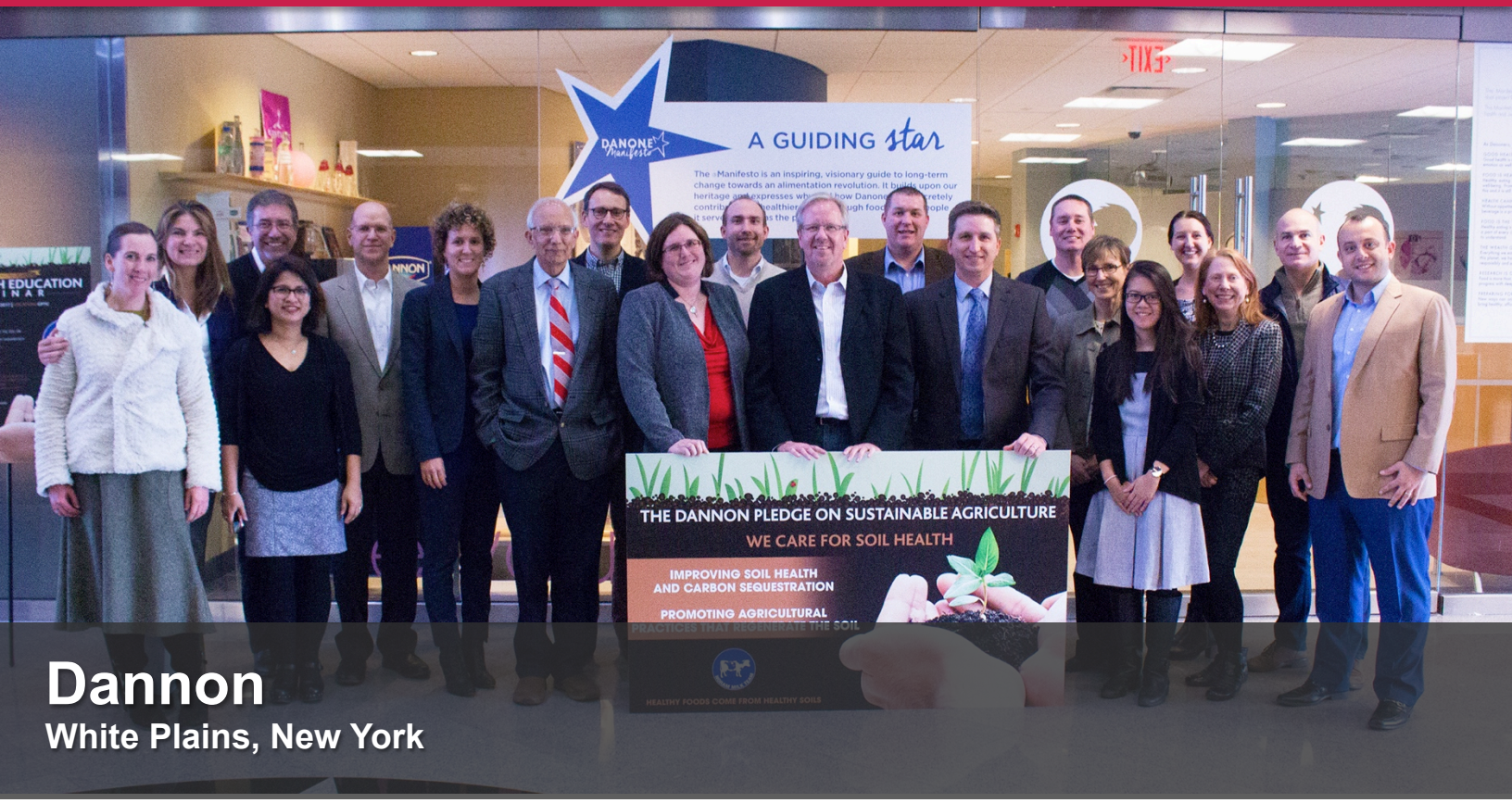
# Crans Montana Africa and South-South Cooperation
## Dakhla, Morocco



The Crans Montana Forum held at Dakhla, Morocco, from 15-19 March 2017 focused on South-South Cooperation. Prof. Lal made a presentation entitled, "Soils, Climate Change and Food Security: The Role of South-South Cooperation" in the session entitled "Strategies and Solutions in Favor of Sustainable Management of Water and Agricultural Soil in Africa." Other members of the panel included policymakers and researchers from ECOWAS, Guinea, NGOs, ICARDA etc. Prof. Lal also met with Rev. Jesse Jackson who participated in the opening panel. The forum was attended by about 500 participants including several heads of state. Secretary of agriculture and environments from Africa and elsewhere.

# Global Symposium on Soil Carbon
## Rome, Italy

The global symposium on soil organic carbon was held at FAP in Rome from 21-24 March 2017. The symposium was attended by about 500 participants from ~100 countries. The symposium was inaugurated by the Director General of FAO, Mr. Da Silva, and the President of Fiji. The COP23 will be partly held in Fiji. Prof. Lal presented a keynote lecture on the topic "Soil Organic Carbon Sequestration: Importance and State of Science." The session was chaired by a Dr. Victor Castillo of the UNCCD, Bonn, Germany. The symposium was organized by the Land and Water Division of FAO.




# Dannon
**White Plains, New York**

The Dannon Co. has made a pledge on sustainable agriculture, naturality and transparency. This includes a new effort on "Sustainable Agriculture: Healthy Foods Begin with Healthy Soils" A workshop was held on 2nd February 2017 at the Dannon headquarters in White Plain, New York. The workshop on "Soil Health" was organized by Ms. Lillian Ruiz (2nd from left) and her staff (Ms. Kristin Pradlik, 3rd from left). Standing next to Prof. Lal in the center front are Dr. Kristin Nichols (Rodale Institute) and Dr. Harold Van Es (Cornell University).

## Distinguished Service Medal Presented to Mr. Stephane Le Foll
Paris, France

Prof. Lal, President of IUSS, presented the Distinguished Service Medal to Mr. Stephane Le Foll , Minister of Agriculture and Forestry of France. The medal was presented on 6th January 2017 at at the INRA headquarters in Paris. Mr. Le Foll launched the program "4 per Thousand" in November 2015 at COP21 in Paris. The strategy is to promote sequestration of organic carbon in soils of the world at the rate of 0.4% per year to 40-cm depth. With the estimated global soil organic carbon stock of ~850 Pg to 40-cm depth, potential sequestration of C at rate of 0.4% per year would create a drawdown of 3.6 PgC/yr from atmosphere into the soil. By adopting "4 per Thousand," Mr. Le Foll has made soil science and agriculture integral to any agenda of addressing global issues of food security, climate change and the environment.

*This was the second ever Distinguished Medal presented by IUSS.*

Dr. Xavier Emmanuelli is co-founder of the "Médecins Sans Frontiers" and received the Nobel Peace Prize. Dr. Emmanuelli was Secrétaire d'Etatuprés du Premier Minster, 1995-97 in France. Prof. Lal (President), Prof. Kosaki (President Elect) and Prof. Feller (Chair, Division 3) met with Xavier Emmanuelli on 5th January in Paris and discussed issues of common interest. A program on "Soil Science without Borders" by the IUSS would be extremely appropriate, and it could be implemented in cooperation with C-MASC.

*Photographed from left to right: Dr. Xavier Emmanuelli, Dr. Christian Feller, Prof. Takashi Kosaki and Prof. Rattan Lal.*

Prof. Rattan Lal and Mr. Horace Smith were class fellows at OSU when both were students in the Department of Agronomy from 1966 to 1968. Mr. Smith was Director of the Soil Survey Division of the NRCS from 1985-2000, developed a cooperative program involving C-MASC (Prof. Lal) and scientists from NRCS (Dr. John Kimble) and ARS (Dr. Ron Follett). This group organized a series of conferences on soil carbon sequestration between 1993 and 2001 and published ~15 books on the topic. The group published the historic book "The Potential of U.S. Cropland to Sequester Carbon and Mitigate Greenhouse Effect" by R. Lal, J. Kimble, F. Follet and C. Cole (1997).

Ms. Virginia Prada Lopez and Ms. Young Wu of the Elsevier Publishers (Amsterdam) presented the Atlas Award to Dr. Rattan Lal on 31st March 2017. The award is for the best article of the month published among 2500 journals of Elsevier cover all branches of science, are and humanity, The selection board consists of the members of civic society including: Clinton Foundation, Health Information for All, International Training and Outreach Center in Africa, TEDMED, UNEP, U.C. Berkley, Global Health Policy Institute, UNU, OXFAM, and Biodiversity International.

***Referred Journal Articles***

- Anghinoni, G., C.A. Tormena, R. Lal, W.H. Moreira, E.B. Junior, C.J.B. Ferreira. 2017. Within cropping season changes in soil physical properties under no-till in Southern Brazil. Soil and Tillage Research 166:108-112.
- Anghinoni, G., C.A. Tormena, R. Lal, W.H. Moreria, E.B. Júnior, C.J.B. Ferreira. 2017. Within cropping season changes in soil physical properties under no-till in Southern Brazil. Soil and Tillage Research 166:108-112.
- Bordonal, R.O., R. Lal, C.C. Ronquim, E.B, Figueiredo, J.L.N. Carvalho, W. Maldonado, D.M.B.P. Milori, N. Scala. 2016. Changes in quantity and quality of soil carbon due to the land-use conversion to sugarcane (saccharum officinarum) plantation in Southern Brazil. Agriculture, Ecosystems & Environment 240:54-65.
- Jha, P., S. Verma, R. Lal, C. Eidson, G.S. Dheri. 2017. Natural $^{13}C$ abudnace and soil carbon dynamics under long-term residue retention in a no-till maize system. Soil Use and Management, doi:10.1111/sum.12323.
- Mehta, S., R. Lal, D. Hansen. 2017. US Land-grant universities in India: assessing the consequences of agricultural partnership, 1952-1972. International Journal of Educational Development 53:58-70.
- Nath, A.J. and R. Lal. 2017. Effects of tillage practices and land use management on soil aggregates and soil organic carbon in the North Appalachian Region, USA. Pedosphere 27(1): 172-176.
- Nawaz, A., M. Farooq, R. Lal, A. Rehman, H. Rehman. 2017. Comparison of conventional and conservation rice-wheat systems in Punjab, Pakistan. Soil and Tillage Research 169:35-43.
- Nawaz, A., R. Lal, R.K. Shrestha, M. Farooq. 2017. Mulching affects soil properties and greenhouse gas emissions under long-term no-till and plough-till systems in alfisol of central Ohio. Land Degradation & Development 28:673-681.
- Sá, J.C.M., R. Lal, C.C. Cerri, K. Lorenz, M. Hungria, P.C.F. Carvalho. 2017. Low-carbon agriculture in South America to mitigate global climate change and advance food security. Environment International 98: 102-112.

***Chapters in Multi-Authored Books***

- Lal, R. 2017. Soil Carbon Impacts on Functionality and Environmental Sustainability. In S. Ersahin, S. Kapur, A. Erhan, A. Namli, H.E. Erdogan (Eds) Carbon Management, Technologies, and Trends in Mediterranean Ecosystems. Springer, pp.1-11.
- Ortas, I., R. Lal, S. Kapur. 2017. Carbon sequestration and mycorrhizae in Turkish soils. In S. Ersahin, S. Kapur, A. Erhan, A. Namli, H.E. Erdogan (Eds) Carbon Management, Technologies, and Trends in Mediterranean Ecosystems. Springer, pp.139-149.
- Zdruli, P., R. Lal, M. Cherlet, S. Kapur. 2017. New world atlas of desertification and issues of carbon sequestration, organic carbon stocks, nutrient depletion and implications for food security. In S. Ersahin, S. Kapur, A. Erhan, A. Namli, H.E. Erdogan (Eds) Carbon Management, Technologies, and Trends in Mediterranean Ecosystems. Springer, pp.13-25

***Invited Keynote Presentations***

- Lal, R. 2017. Soil Carbon Sequestration: Technical Potential and Options. IUSS award presentation, 6 January 2017, Paris, France.
- Lal, R. 2017. Soil as a Nexus Tool. FEW Nexus Workshop, 25-27 January 2017 at Texas A&M University, College Station, Texas.
- Lal, R. 2017. Soil Health and Carbon Sequestration. Dannon Workshop on Soil Health, 2 February 2017, White Plains, New York.
- Lal, R. 2017. Soils, Climate Change and Security: The Role of South-South Cooperation, Crans Montana Forum on Africa and South-South Cooperation, 16-21 March 2017, Dakhla, Morocco
- Lal, R. 2017. Soil Organic Carbon Sequestration: Importance and State of Science. Global Symposium on Soil Organic Carbon, 20-23 March 2017, Rome, Italy.
- Lal, R. 2017. Climate Change and Agriculture in India.

**Do you have contributions for our next newsletter?**
**Please contact us!**

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