Fall/Winter 2011

THE OHIO STATE UNIVERSITY OARDC

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New Hires at C-MASC

Post Doctoral Researchers

Dr. Richard (Ruiqiang) Liu
Postdoctoral Researcher
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Dr. Liu, originally from China, obtained his PhD in Environmental Engineering at Auburn University, 2007 and has worked as a postdoctoral researcher at Purdue University and Miami University (Ohio).

Before joining C-MASC in September, 2011. Dr. Liu's primary research interests are improvements of water, soil and air quality for environmental protection purposes (including reduction of green house gas emissions) using engineering methods. Dr. Liu's expertise includes soil chemistry, soil mineralogy, water chemistry and hydrology

Dr. Liu's specific task in CMSC is to enhance the soil carbon storage and sequestration capacity of mine soil through soil amendments. Mine soil reclamation for minimizing the environmental impacts of the mining activities is not a new topic. But it is not realized until recently that mine soil has higher available carbon storage capacity than the other soils for agricultural uses and the successful and permanent establishment of the vegetation on mine soil is able to make a full use the capacity to sequester the carbon. Research on improve the mine soil quality for the best vegetation establishment using minerals, solid wastes, biochars etc. are very important for this purpose.

Inside:

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New to C-MASC

Post Doctoral Researchers

Dr. Toru Nakajima

Postdoctoral Researcher
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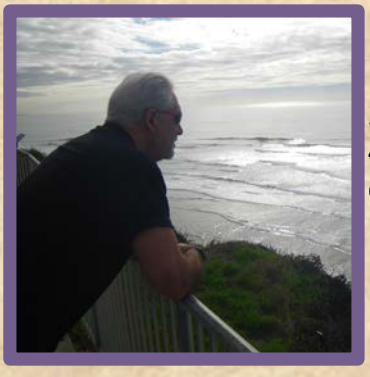
EMAIL: nakajima.9@osu.edu

I am Dr. Toru Nakajima, PhD (Soil Physics) graduate from Department of Agriculture Engineering, Tokyo University of Agriculture and Technology in summer 2010. My Ph.D. work focused on gas movement in the soils. From winter 2010, I have worked as a visiting scholar in the Department of Geoscience, University of Texas-Arlington. I have joined the CMASC on October 2011 as a Postdoctoral Researcher. My research areas include: Data analysis of GHG emissions from long-term no-tillage systems, and Soil Gas Diffusivity.



Dr. Gerald R. Allen

Postdoctoral Researcher
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I am currently working with Dr. Rattan Lal in the CMASC as a postdoctoral researcher on the Large-scale Demonstration of Soil Carbon Sequestration in Reclaimed Mine Soil in Ohio project. After receiving my B.A. in geology at SUNY at Potsdam in 1970 and completing course work for an M.S. in geology at Western Michigan University in 1972, I moved to the West Coast.

For the next 28 years I worked for 5 different Southern California and Oregon geotechnical engineering, geological, and environmental consulting firms on numerous public and private projects throughout the United States.

In 2000, I returned to graduate school in the School of Earth Sciences (formerly the Department of Geological Sciences) at The Ohio State University. As an advisee of Dr. Frank Schwartz, the focus of my M.S. (2004) and Ph.D. (2011) was hydrogeology and hydrology. Specific areas of expertise and interest include fate and transport of nutrients in Ohio surface waters; surface water quality and quantity at the watershed scale; statistical and ArcGIS-ArcMap compilation and analyses of hydrological and meteorological data; ERDAS IMAGINE remote sensing and spatial modeling of land use and surface hydrological features; ground water and surface water modeling; hydrology of wetlands; and climate change and its effect on the hydrological cycle.

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New to C-MASC

Visiting Scholars

Ms. Yanru Liang

PhD student, Northwest A&F University, China
liang.304@osu.edu

I'm from China, my major is soil science, and my interest research is in soil carbon sequestration, soil enzyme, and restoration of eroded ecosystem. I am a joint training PhD student at OSU for two years from October 2011 to October 2013. I'll do research at CMASC under the supervise of Dr. Rattan Lal, studying the effects of soil erosion on carbon sequestration as well as managements to enhance the soil stability and carbon storage capacity.

Dr. Narendra Kumar Lenka

Senior Scientist (Soil Physics)
Indian Institute of Soil Science, Nabiabgh,, Bhopal, India
e-mail: nklenka@rediffmail.com

Dr. Narendra Kumar Lenka is a Senior Scientist (Soil Physics) at Indian Institute of Soil Science, Bhopal, India. Under the Norman E. Borlaug International Agricultural Science and Technology Fellowship Program, he has been selected as a USDA Norman E. Borlaug fellow for the year 2011 and for his program Ohio State University was selected by USDA as the host university with Dr Rattan Lal as his mentor.

He is a Masters and Ph.D. in Soil Physics from Indian Agricultural Research Institute, New Delhi and has about 11 years professional experience in soil physics and soil and water conservation. He has worked in the areas of soil moisture simulation modeling and rehabilitation of degraded lands through alternate land use measures in tribal dominated Eastern and North Eastern regions of India.

During his fellowship period from 09th October, 2011 to 06th January, 2012 at CMASC, he is working on relationship of soil moisture and weather variables with greenhouse gas flux under selected crop management practices. He is the SENR guest lecturer Jan. 5, 2012.

Visiting Scholars

Summary of Presentation

Dr. Florent Tivet

School of Environment and Natural Resources (SENR)
Invited Guest Speaker
Nov. 3, 2011

Dr. Florent Tivet (CIRAD, French Agricultural Development Center, www.cirad.fr) has worked for 9 years in Laos, implementing a national program on Conservation Agriculture under the umbrella of the Ministry of Agriculture and Forestry and the National Agriculture and Forestry Research Institute of Laos. He joined the CMASC last August and will work with C-MASC until June 2012 working on "Changes in soil organic carbon under no-till systems in tropical and sub-tropical agroecoregions of Brazil".

Florent was an invited speaker for the weekly seminar program for SENR, and presented the experience of CIRAD and his partners on no-till farming in the tropics. This work is coordinated by Dr. Lucien Séguy and Dr. Serge Bouzinac (CIRAD), who are involved with their Brazilian partners on the development of NT systems for the Cerrado region since the 90's. During the last 20 years, they have transferred their knowledge to others CIRAD agronomists, national research and extension agencies, helping smallholders to establish diversified no-till systems, to protect the soil resource, to enhance productivity, and to diversify farming systems. During this seminar, emphases have been given to large scale farming looking at the Brazilian experience on the Cerrado region, and on small-scale farming with experiences from Cameroon, Madagascar, Cambodia and Laos.

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Visiting Scholars

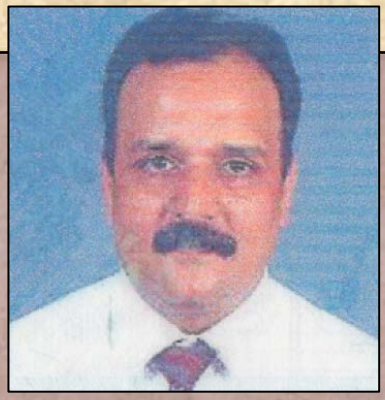
Summary of Presentation, Continued…

Dr. Florent Tivet

School of Environment and Natural Resources (SENR)
Invited Guest Speaker
Nov. 3, 2011

A specific topic has been presented on NT rice and the use of Sebota cultivars adapted to contrasting conditions (from the upland to the lowland). These experiences emphasized the large adaptability of NT systems to restore degraded soils, to enhance crop productivity, and to answer to the main challenges of food security, while ensuring a sustainable management of the soil resource. Some pictures from Brazil, Laos, Cameroon, Madagascar and Cambodia are given hereafter.

Visiting Scholars



Dr. Gyanendra Singh

Senior Scientist
Division of Physiology & Climatology
Indian Veterinary Research Institute
Izatnagar, Bareilly – 243 122 INDIA

I am deputed here for three month training in the area of Carbon Trading/ Carbon Sequestration Climate Change (Animal Science). I am returning to India 19th December, 2011.

Methane production through enteric fermentation is of concern worldwide for its contribution to climate change as it is known to be a potent greenhouse gas. Methane is produced in the rumen of ruminant animals by a group of microbes known as methanogens. Methanogens are known to have symbiotic relationships with rumen protozoa and can be associated intracellularly and extracellularly. I am studying the specificity of symbiotic methanogen with rumen protozoa (Entodinium and Epidinium) using fluorescent in situ hybridization technique at department of animals sciences.

Dr. Felix Heitkamp

Akademischer Rat a.Z. (Research Associate)
September 1 to December 17 in 2011
Landscape Ecology
Faculty of Geoscience and Geography
Georg August-University Goettingen, Germany
Contact: fheitka@uni-goettingen.de

Dr. Felix Heitkamp is a landscape ecologist working on the anthropogenic influence on soil functions and greenhouse gas emissions. He is specialized in research on soil organic carbon cycling. Applied methods include physical and chemical fractionation techniques, use of the stable carbon isotope for turnover studies and modelling of carbon dynamics in agricultural long-term experiments. This helps in evaluation and development of management options to improve soil quality and reduce greenhouse gas emissions from soil. During the stay at C-MASC Felix developed a design to minimize variation in greenhouse gas measurements at the field scale and contributed a chapter to the book “Recarbonization of the Biosphere“, edited by Dr. Rattan Lal and Colleagues.

Visiting Scholars

Summary of Presentation

Dr. Xiangbin Kong

School of Environment and Natural Resources (SENR)
Invited Guest Speaker
Oct. 27, 2011

China has succeeded in feeding 22% of the world's population with only 7% of the world's arable land area. However, food security had been achieved strongly on the basis of increase in irrigated area and application of high rate of chemical fertilizers under the great pressure of loss of high fertility arable land caused by rapid urbanization and industrialization. At the same time, grain-derived water consumption had a good match with grain production. Thus, China has become the highest agriculture intensification county in the world. The positive effect is the increase in crop production with the increase in intensification in agricultural in China, but, the negative effects of the highest intensification is the groundwater depletion, and environmental pollution.

Huang-Huai-Hai plains (HHH) have the highest agricultural intensification in China with high input of chemical fertilizer and the increasing trends in irrigation use. The yield for wheat and maize in the HHH region is above the China's national average, and is increasing. It produces 60-80% of China's total wheat, and 35-40% for maize. However, HHH is the most unbalanced region in terms of the match between water and arable land, with 7.2% of total for water, and 23% of total arable land in China. The total water demand for irrigation, is 60-80% of the total, and more than 70% for irrigation is from the ground water. Thus, agricultural intensification leads to the rapid depletion of groundwater across the HHH region. Under the high agricultural intensification, the agricultural technique such as improvement in water efficiency by micro-irrigation (drip), increase in soil quality by improving soil organic carbon (SOC) concentration via mulching, conventional tillage (CT), manuring, and adoption in integrated nutrients management (INM) and balanced application of nutrients should be extensively introduced in the HHH region.

X. Kong, Soil profile in North east of China (2009)

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Visiting Scholars

Certificate of Completion

Dr. Xiangbin Kong

School of Environment and Natural Resources (SENR)
Received the Award in November 15, 2011

Dr. X. Kong received the certificate of recognition of the 6th Annual International Scholar Research Exposition. The award was presented by President Gee at the ceremony held in the Bricker Hall on 15th November 2011.

Pictured below from left to right:
Vice President Whitacre, President Gee, Dr. Kong and Dr, Wanner of the Office of International Affairs.

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Meetings: SSSA

SSSA Meeting, San Antonio, TX Oct. 16-19, 2011

Two C-MASC researchers, Dr. Sandeep Kumar and Mr. Josh Beniston attended to present Dr. R. Lal's presentations at the annual Soil Science Society of America Meetings.

Soil Carbon Sequestration and Ecosystem Services
Rattan Lal (presented by Dr. S Kumar)

Quality of most agricultural soils, depleted of their soil organic carbon (SOC) pool because of historic land use and management, is degraded and characterized by poor soil structure, unfavorable porosity and pore size distribution, water and nutrient/elemental imbalance, and low activity and species diversity of soil fauna and flora. Decline in soil quality, exacerbated by a severe reduction in SOC pool to below the critical/threshold level, jeopardizes numerous ecosystem services. Thus, re carbonization of soils of the agro ecosystems can enhance ecosystem services. Important among these are increase in the net primary productivity (NPP) and advancing food security, improvement in quality and quantity of renewable water resources, increase in biodiversity, and adaption and mitigation of climate changes. Thus, incentivization of land managers by payments for ecosystem services is essential to the re carbonization of agricultural soils through adoption of those land use and soil management practices which create a positive C budget.

Agricultural Mitigation of Climate Change: Potential And Challenge
Rattan Lal (presented by Dr. S. Kumar)

Agricultural soils, comprising of about 1500 million hectares (Mha) of croplands and 3500 Mha of grazing/pasturelands, can be source or sink of greenhouse gases (GHGs) depending on land use and management. Food security being of the highest priority, conversion to a judicious land use and adoption of the soil/site-specific recommended management practices (RMPs) are important to creating a positive ecosystem C budget and making agricultural soils a sink of atmospheric CO_2. The technical potential of C sequestration in agricultural soils is 0.4-1.2 Pg C/yr for croplands, 0.3-0.5 Pg C/yr for savanna/grasslands, and 0.5-1.4 Pg C/yr for restoration of degraded/desertified lands. Realization of this potential, however, depends on incentivization of land managers through just and fair payments for ecosystem services.

Meetings: SSSA

SSSA Meeting, San Antonio, TX Oct. 16-19, 2011

Estimating Soil Organic Carbon in Major Land Resource Areas and Land Uses of Midwestern Region of USA
Drs. Sandeep Kumar and Rattan Lal

Relationship between soil organic carbon (SOC) and environmental variables has long been studied for estimating the SOC density at the unsampled locations. Considering non-stationary relationship at local scale, and by incorporating the regression residuals within the kriging, estimations can be improved. Therefore, the geographically weighted regression kriging (GWRK), a local spatial statistical approach was used in the present study to estimate the SOC across the Midwestern United States. Results from this study support the conclusion that GWRK produced satisfactory predictions with lower root mean square error (5.60 kg m^{-2}), mean estimation error (0.01 kg m^{-2}) and mean absolute estimation error (4.30 kg m^{-2}), and higher R^2 (0.58) and goodness-of-prediction statistic (G = 0.59) values.

Croplands of the region store 16.8 Pg C followed by shrubs (5.85 Pg) and forests (4.45 Pg). Total SOC pool for the Midwestern region ranges from 31.5 to 31.6 Pg. This study illustrates that GWRK approach explicitly addresses the spatial dependency and spatial non-stationarity issues for interpolating SOC density across the regional scale.

Carbon Sequestration and Nutrient Cycling in Urban Soils
Dr. R. Lal (presented by Mr. J. Bensiton)

On October 17, 2011 Josh Beniston presented "Carbon sequestration and nutrient cycling in urban soils" on behalf of Dr Lal at a symposium entitled Urban soils: Properties, problems and needs. The symposium was organized by members of SSSA Div 06 - Soil & Water Management and conservation and was well attended by both established researchers and graduate students. Dr Lal's presentation highlighted the increasing population, land area, and growth of urban areas worldwide and their impact on global biogeochemical cycles. While urban areas occupy only 2% of the global land area, upwards of 70% of all anthropogenic C emissions are connected to urban areas. The presentation also focused on opportunities for managing urban soils to obtain ecosystem services, C sequestration, and urban agriculture.

Josh also presented a poster at the symposium entitled "Improving soil quality for vegetable production in a recently disturbed vacant lot soil." The poster highlighted results from an urban agriculture soil experimental site that has been established in Youngstown, OH and is part of Josh's dissertation research which focuses on evaluating and managing soil quality for urban agriculture. For more information on CMASC's innovative research on urban soils and urban agriculture contact Josh Beniston at beniston.2@buckeyemail.osu.edu

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Global Soil Forum Workshop, IASS, Potsdam, Germany Oct. 26-28, 2011

Carbon Sequestration and Ecosystem Services

Summary

About 20 participants from Australia, Austria, Brazil, China, Egypt, Germany, Kenya, South Africa, Thailand, United Kingdom along with policy makers met at the IASS in Potsdam, Germany, to elaborate on the consequences of recarbonization of the biosphere for ecosystem services (ES). Participants discussed (i) the effects of carbon (C) sequestration on ES, (ii) what practices are needed to both restore C pools and enhance ES, (iii) how stakeholders can be incentivized for maximizing benefits from C sequestration and ES, and (iv) what types of ES are in need of policy interventions in a recarbonized biosphere.

With regard to provisioning ES it was concluded that the effects of recarbonization are generally positive except for water yield depending on the environmental context. Recommended management practices for recarbonization are available, and subsidies and other policy instruments (e.g., C markets) are appropriate to implement the practices but integrated interdisciplinary research is needed for maximizing benefits. The distribution of C in the terrestrial biosphere was identified as primary issue for the integrity of regulatory ES. This can be assessed at places where the regulatory ES are degraded and, with respect to C, where there is too little C (e.g., dry tropics, arid and semiarid subtropics, mountain areas), too much C (e.g., methane hydrates), and C pools excessively vulnerable to disturbance (e.g., permafrost, peatlands, forest ecosystems). Generic process knowledge is adequate to assess the integrity of regulatory ES but system-level knowledge is very poor. Pressure indices may be appropriate to quantify the relative performance of regulatory ES in space and time. Local, regional and global scale can potentially benefit from policy interventions but the global community is currently not able to collectively manage the global commons in the Anthropocene. Custom-made practices are required to maximize C sequestration and cultural ES. However, cultural values of local communities must be thoroughly understood by socio-cultural investigations. Tax reductions for sustainable land use practices and certification of goods and products were discussed as incentives to maximize benefits from C sequestration and cultural ES. Education was identified as key tool to raise awareness and enhance responsibility.

In summary, interdisciplinary and multidisciplinary approaches are needed to implement land and soil management practices for maximizing benefits from C sequestration and restoration of ES. The science/policy interface is critical, and transfer of scientific knowledge into policies must be enhanced. Clear scenarios for costs/benefits/impacts with regard to stakeholders and ecosystems in the short/medium/long term must be developed.

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Meetings

Kuwait Institute for Scientific Research, November 13-17, 2011

12th Aarinena General Conference and International Conference on Adaptation to Climate Change and Food Security in West Asia and North Africa

13-17 November, 2011 State of Kuwait

Kuwait Institute for Scientific Research

Participants of 2011 meeting

Kuwait City, 13-16 November 2011

Kuwait Institute for Scientific Research Conference Declaration

The International Conference on Adaptation to Climate Change and Food Security in West Asia and North Africa (WANA) was held at the Kuwait Institute of Scientific Research (KISR) from 13 to 16 November 2011. It was jointly sponsored by the World Meteorological Organization (WMO), the Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA), the Food and Agriculture Organization (FAO) of the United Nations, the International Center for Agricultural Research in the Dry Areas (ICARDA), the Ohio State University, the Kuwait Institute for Scientific Research, the Meteorological Department of the State of Kuwait, the Global Forum on Agricultural Research, and the European Union. The Conference was attended by around 80 participants from 18 countries and nine international and regional organizations and institutions..

The Conference identified several key recommendations, knowledge gaps, and opportunities for policy makers, researchers and extension systems, international organizations, and NGOs to implement programs designed to minimize short- and long-term vulnerability of the WANA region to climate change. Principal recommendations are to:

Strengthen regional cooperation and exchange of successful experiences among countries through the creation of a Climate Change and Food Security in West Asia and North Africa Network (CCFSWANANet);

Improve collection and dissemination of weather-related information by improving weather station networks to strengthen monitoring of extreme events and their impacts on food production and availability;

Stimulate multi-disciplinary research on climate change and food security with emphasis on climate change projections, early warning systems, land use planning and hazard zonation, diversification of production systems, breeding crops for climatic stresses, improving water efficiency, precision agriculture, disease surveillance and monitoring;

Develop innovative strategies that contribute to socio-economic sustainability of the production systems in fragile environments through promotion of effective risk management and risk reduction strategies including risk sharing and transfer mechanisms; crop….continued on page 12…

Continued from Page 11....diversification and better use of seasonal climate forecasts; promotion of integrated farming systems through livestock raising, forestry and fisheries; adoption of sustainable land and water management for more productive agriculture; use of more effective pest, disease and weed management practices; and land use changes to take advantage of modified agroclimatic conditions;

Promote mitigation options to climate change through sustainable intensification of production systems and rehabilitation of rangelands which will enhance carbon sequestration;

Enhance capacity building activities in the region and strengthen the data collection capability, analysis and modeling;

Increase public and private investment in climate change adaptation, enhance capacity to access other available financial resources and develop social safety nets so that poor people could be given access to development programmes and insurance;

Integrate science, practices and policy by mainstreaming adaptation into existing projects and programs and integration of options for improvement of rural livelihoods;

Initiate and strengthen cooperation among academic and research institutions, international organizations, and NGOs to provide opportunities for strengthening institutions, human resource development and capacity building;

Enhance coordination among relevant ministries and institutions at the local, national and regional levels to better understand how farmers, fishermen, foresters and herders, are coping with climate change for improving transfer of best practices;

Develop innovative financial mechanisms to scale up technical and financial support for the adaptation efforts of the WANA countries; and

Strengthen regional institutional and policy mechanisms to promote and facilitate implementation of location-specific adaptation and mitigation practices.

16 November 2011, Kuwait City, Kuwait

Carbon Management & Sequestration Center

BEST WISHES FOR 2012

Sincere thanks for your kind support and cooperation. We envisage to strengthen the coopertation on thematic topics of mutual interest during 2012 and beyond.

Wishing you and your family a very happy, healthy, peaceful and professionally rewarding 2012.

Rattan Lal
Columbus,OH

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