

The 2015 Joint US-China Annual Conferences of the U.S.-China EcoPartnership for Environmental Sustainability and the China-U.S. Joint Research Center for Ecosystem and Environmental Change

Critical Zone Science, Sustainability, and Services in a Changing World

October 22-24, 2015, Purdue University, West Lafayette, IN. U.S.A.

Beck Agricultural Center <https://ag.purdue.edu/arp/beck/Pages/default.aspx>
and the Holiday Inn Lafayette-City Center.

This conference is run in conjunction with:

- 2015 workshop on Flux, Stabilization, and Reactivity of OM in the Critical Zone organized by the U.S. National Science Foundation Critical Zone (CZ) Observatory Network, Working Group on Organic Matter (OM) in the CZ.
- The Consortium for the Advancement of Hydrologic Science Instrumentation (CUAHSI) instrument training short course on “The Role of Runoff and Erosion on Soil Carbon Stocks: From Soilscales to Landscapes” **Beginning October 20.**

1. INTRODUCTION AND CONTEXT

The intensification of natural resource extraction from terrestrial systems is occurring at a breakneck pace and in many cases without adequate knowledge—or with complete disregard—of the limits and capacity of the supporting ecosystems, water resources, air and soil quality, and surface geology. The complex interactions across these environmental domains that function to support human activity occur in what has been recently conceptualized as the Earth's “Critical Zone” (CZ), the thin surface layer from the top of vegetation to the bottom of aquifers. Rapid growth in human population, changing consumption patterns, and climate change are intensifying pressures on the CZ, especially in emerging economies such as China.

The 2015 Joint Annual Conferences of the US-China EcoPartnership for Environmental Sustainability (USCEES) and the China-US Joint Research Center for Ecosystem and Environmental Change (JRCEEC) will focus on critical zone science, sustainability, and services. It will bring together and leverage the scientific communities from the USCEES, the JRCEEC, and members of the US Critical Zone Observatory Network (US-CZO) to address key aspects of CZ function and services and the threats to its sustainable use from a changing climate, increasing urbanization and population, and increasing resource extraction pressure.

The USCEES, one of 30 current US-China EcoPartnerships, was established within the U.S.-China Strategic Economic Dialogue (SED) framework in May 2011. The six organizations that form the core group of the USCEES combine the capabilities of three U.S. institutions (Purdue University's Global Sustainability Initiative, University of Tennessee's (UT) Institute for a Secure and Sustainable Environment and Institute of Agriculture, and the UT-Oak Ridge National Laboratory Joint Institute for Biological Sciences) with three complementary center and institute partners of the Chinese Academy of Sciences (the Institute of Geographic Sciences and Natural Resources Research, the Research Center for Eco-Environmental Sciences, and the Institute of Applied Ecology). The USCEES was developed from the JRCEEC, which was

established in July 2006 between the Chinese Academy of Sciences, the University of Tennessee, and Oak Ridge National Laboratory and later Purdue University.

2. CONFERENCE AND WORKSHOP GOALS AND OBJECTIVES:

The conference will be organized with a common plenary session each morning followed by afternoon thematic symposia and workshops. On the last day of the conference a field trip will explore the field sites for the Intensively Managed Landscapes Critical Zone Observatory.

A. Scientific Sessions: Invited and voluntary contributions to oral and poster presentations on CZ -related topics will include but are not limited to:

- a. Near surface flux of solid, dissolved, and gaseous C and N from soil, weathered outcrop, and litter organic matter in catchments
- b. CZ services and functions regulating anthropogenic-sourced contaminant reactivity, mobility, and mean residence time
- c. Controls on microbially-driven cycling of elements in shallow and deep soil profiles.
- d. Mechanisms of stabilization/destabilization of organic matter in soils
- e. The role of hydrology and mineralogy in the deep connectivity of dissolved organic matter and associated inorganic elements in the CZ profile
- f. Climate and land use regulation of C, N, and water cycles in terrestrial ecosystems

B. NSF Cross-CZO Working Group on Organic Matter Workshop: At this conference the cross-CZO Working Group on Organic Matter (XCZO-WG-OM) will organize afternoon and evening workshops focused on flux, stabilization, and reactivity of organic matter in the CZ with the goal of making recommendations to NSF for common measurements, common methods, common laboratories, and common experiments to support cross-U.S. CZO and international CZ science. Three workshops are planned and include 1) multivariate and chemometric methods for large and complex data set analysis in CZ science, 2) organic matter dynamics as controlled by erosion and deposition, 3) mineralogical and microbial controls on soil and sediment OM reactivity and persistence. The findings and recommendations from these workshops will be presented to the CZO National Office and will support the XCZO-WG-OM overarching mission to define what controls 1) the organic matter storage in biomass above the critical zone, 2) organic matter storage and flux in the mineral and soil matrix, 3) gaseous exports of organic matter from the critical zone, and 4) dissolved and colloidal organic matter flux from and within the critical zone. The NSF workshop descriptions are as follows:

Multivariate/chemometric methods for large and complex data set analysis in CZ science. Rationale-Faster and less expensive methods to assess biogeochemical, geomorphic, and environmental drivers of organic matter dynamics in the CZ are needed particularly considering the opportunities to work across large sample sets and locations in networked research such as in Ameriflux, Chinaflux, CERN, CZO, LTAR, LTER, and NEON. Statistical approaches calibrating high throughput spectral measures with higher resolution and sensitivity tools that are often costlier and more labor intensive offer strong

predictive potential. Contributions and discussions will focus on the use statistical methods to correlate organic geochemical (e.g. Diffuse reflectance FT-IR spectroscopy (DRIFT), solid and liquid state NMR, thermal analysis, complex biomarker assemblages from gas and liquid chromatography analysis, and stable isotopic and other geochemical properties) across large data sets. This workshop will inform recommendations for common measure and metrics for OM analysis.

Organic Matter Dynamics As Controlled by Erosion and Deposition. Rationale- Over a broad range of time scales, soil organic matter (SOM) processes are strongly influenced by soil erosion, deposition and the development of landscape macro/microtopography. Through the natural coevolution of geomorphic, pedogenic, and ecological processes in the critical zone or by punctual changes in these processes as a result of intensive management, dynamic landscapes establish characteristic hierarchies of physicochemical controls on organic matter stability. These mechanisms include physical isolation of organic matter (OM) inside aggregates, the chemical interaction of OM with soil minerals, and the molecular structure of primary or altered soil organic matter that defines the state of SOM persistence/resilience. Contributions and discussions will focus on addressing soil organic matter dynamics as controlled by runoff, erosion, deposition and macro/microtopography. This workshop will inform recommendations for common questions related to erosion and dynamics of OM. Additionally, common measure to assess flux and stabilization of erodible OM will be informed. This workshop will link to the CUAHSI student-training program on SOILSCAPES which will also be run at the conference.

Mineralogical and Microbial controls on soil and sediment OM reactivity and persistence. Rationale- Strong organo-mineral interactions are arguably the most important mechanisms governing long-term C stabilization in shallow and, in particular, deep soil and sediments horizons. Such physico-chemical interactions have a fundamental control on the microbial decomposition of soil and dissolved OM and also control the subsequent stabilization of microbial necromass. While the main contributions to soil organic matter include plant residues, microbial necromass, rhizodeposits, and pyrogenic organic matter a finite range of organo-mineral interactions, including ion exchange, ligand exchange, hydrophobic interactions, or weak electrostatic interactions, control the accessibility of OM to microbes regardless of the availability of other required nutrients and moisture needed for anabolic and catabolic processes. Contributions and discussions will focus on both organo-mineral and microbial controls on OM dynamics in the CZ either through field based observation, ab-initio calculations, or experimental field or lab experiments.

C. CUAHSI Instrument Training Short Course: We have the good fortune to also include an educational activity in the form of a CUAHSI instrument training short course on “The Role of Runoff and Erosion on Soil Carbon Stocks: From Soilscales to Landscapes”. The course, which will run from October 20-21-starting two days prior to

the main conference activities, is aimed at graduate students and designed to inform participants about the state-of-the-art instrumentation and measurements that are available for quantifying carbon dynamics in Intensively Managed Landscapes (IMLs). This course will examine the key processes that define carbon budget in intensively managed landscapes, which include erosion, litter incorporation into the soil profile, microbial activity/ respiration, and stabilization in aggregates. Field demonstrations of mobile rainfall simulators will be used demonstrate soil movement, deposition, and reactivity with a variety of field and lab-based tools. A separate registration portal will be established for interested graduate and postdoctoral researchers.

D. Field Trip to Upper Sangamon Water IML-CZO: On the last day of the conference, October 24, a field trip to visit research infrastructure of the IML CZO in the Upper Sangamon Watershed near University of Illinois will be available to participants. We anticipate this will of particular interest to our Chinese colleagues as they consider options for how to develop a similar CZO platform.

3. TENTATIVE SCHEDULE OF CONFERENCE EVENTS

Tuesday, October 20, 2015:

Day one of the two-day CUAHSI short course on “The Role of Runoff and Erosion on Soil Carbon Stocks: From Soils to Landscapes (see course description and itinerary)”. To be held at the Purdue’s Agricultural Center for Research and Education (<https://ag.purdue.edu/agry/acre/Pages/default.aspx>) and led by Dr. Thanos Papanicolaou, Univ. of Tennessee (<http://cee.utk.edu/people/people.php?id=tpapanic>).

Wednesday, October 21, 2015:

Day two of the two-day CUAHSI short course on “The Role of Runoff and Erosion on Soil Carbon Stocks: From Soils to Landscapes (see course description and itinerary)”.

Conference attendees arrive and check in at Hotel: Holiday Inn, Lafayette City Centre. International visitors may wish to arrive on October 20 to acclimate.

Optional conference dinner for international guests.

Thursday, October 22, 2015:

Day One of Conference/Workshop

8-12 Breakfast, Opening session and keynote speakers.

12-1:15 lunch

Bus to Beck Agricultural Center

1:45-4:30 Working groups or thematic oral presentation sessions (4 simultaneous)

Demonstration of ISEE software (<http://isee.purdue.edu>) weather permitting

5:30 – 6:30 Break out session reports
6:30 – 8:00 Dinner

Friday, Oct. 23

8-12 Breakfast, Opening session and keynote speakers.
12-1:15 lunch

Bus to Beck Agricultural Center

1:45-4:30 Working groups or thematic oral presentation sessions (4 simultaneous)
Demonstration of ISEE software (<http://isee.purdue.edu>) weather permitting

5:30 – 6:30 Break out session reports
6:30 – 8:30 Dinner

Saturday, Oct. 24

7-8:30 Breakfast

Bus to Beck Agricultural Center

9:00 – 10:00. Graduate student led presentations on CUAHSI short course outcomes.
10:00. – 11:30 Closing remarks, final recommendations, proposal discussion, and report time line.

11:30 – 12:30 Lunch

12:30-1:30 pm: Optional Tour of Purdue University Water Quality Field Station

1:30 – 7:00 Optional bus trip to sites at the Intensively Managed Landscapes CZO at University of Illinois, Champaign

8:00 Dinner for Scientists from China

Sunday, Oct. 25

Visitors from China to depart.

Conference and workshop registration will begin on July 10. Please request letters for VISA applications as soon as possible.

SPONSORS

- U.S. National Science Foundation
- Purdue University Global Sustainability Institute
- Purdue University Global Engineering Program
- The Confucius Institute - Purdue

ORGANIZING COMMITTEE

Chairpersons:

-Dr. Timothy Filley (Purdue University, USCEES and IML-CZO)
-Dr. Guo DaLi (Institute of Geographic Sciences and Natural Resources Research-Chinese Academy of Sciences)

SCIENTIFIC COMMITTEE

Asmeret Berhe (University of California-Merced- Sierra CZO)
Sharon Billings (University of Kansas-Calhoun CZO)
Indrajeet Chaubey (Purdue University- IML CZO)
Jon Chorover (University of Arizona-Catalina-Jemez CZO)
Weixin Cheng (University of California Santa Cruz; Institute of Applied Ecology-CAS)
Yunting Fang (Institute of Applied Ecology-CAS)
TiDa Ge (Institute of Subtropical Agriculture-CAS)
Marie-Anne deGraaff (Boise State University-Reynolds Creek CZO)
Genxing Pan (Nanjing Agricultural University)
Dali Guo (Institute of Geographic Sciences and Natural Resources Research-CAS)
Chi-Hua Huang (USDA - National Soil Erosion Lab)
Cliff Johnston (Purdue University)
Praveen Kumar (University of Illinois-IML CZO)
Meiling Li (Institute of Geographic Sciences and Natural Resources Research-CAS)
Henry Lin (The Pennsylvania State University -IML CZO and Shale Hills CZO)
Kitty Lohse (Idaho State University -Reynolds Creek CZO)
Thanos Papanicolaou (University of Tennessee -IML CZO).
Alain Plante (University of Pennsylvania -Luquillo CZO)
Craig Rasmussen (University of Arizona-Catalina-Jemez CZO)
Dan Richter (Duke University Calhoun CZO)
Gary Sayler (University of Tennessee)
Aaron Thompson (University of Georgia Calhoun and Luquillo CZO)
Ron Turco (Purdue University)
Adam Ward (Indiana University IML CZO)
Xudong Zhang (Institute of Applied Ecology-CAS)
Jie Zhuang (University of Tennessee)

REGISTRATION

A 100 USD registration fee will be charged for participants. The conference organizers will provide local transportation between the airport and hotel at no cost of the guests, and most of meals will be covered by the organizers during the meeting. Requests for financial assistance will be considered by the organizing committee. Open registration will begin on or about July 10. In the registration form please indicate if you have a need for an official letter of invitation to attend and if you are seeking financial support.

HOTEL, TRANSPORTATION, AND FOOD

A block of rooms for conference participants will be reserved at Holiday Inn City Center Hotel, Lafayette Indiana. The room rate will be posted on the registration web site and the cost will be born by the participant. Breakfast, lunch, and dinner for the duration of the conference will be provided for all registered participants and covered through registration fees and sponsor support. Travel to and from O'Hare international airport will be provided by the conference organizers according to scheduling.

CONTACT INFORMATION

Dr. Timothy Filley

Department of Earth, Atmospheric, and Planetary Sciences
Purdue University, West Lafayette, IN. 47907.
Phone 7654794329
EMAIL: filley@purdue.edu

Organization Web Sites:

US-China Ecopartnership for Environmental Sustainability

English Language - <http://www.purdue.edu/discoverypark/ecopartnership/>

本网站中文版 - <http://www.purdue.edu/discoverypark/ecopartnership-cn/>

China-US Joint Research Center for Ecosystem and Environmental Change

<http://jrceec.utk.edu>

U.S. Critical Zone Observatory Network

<http://www.czen.org>