2019 China-US Joint Eco-environmental Symposium
“Research and Innovation at the Nexus of Food, Energy and Water”

October 26-29, 2019
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INTRODUCTION

Climate change, urbanization, population growth, and accelerating consumption of energy and natural resources bring great challenges for regional and global sustainable development. It is becoming imperative that society integrate across the natural and built environments to provide for a growing demand for food, energy, and water while maintaining key ecosystem functions and services. However, addressing the entangled relationships among agricultural, environmental, and socio-economic systems is challenging—especially at a global scale.

The U.S. and China lead the world in the consumption of petroleum products, release of greenhouse gases, and food marketing. Although the two nations are geographically distant and differ substantially in terms of natural resources, energy resources and utilization, political structure and economic models, as well as cultural heritage, China and the U.S. confront many of the same FEWS (food, energy, water systems) and associated environmental challenges.

In recent decades, the urbanized areas in China have expanded from 17% in 1978 to 52% in 2012. Meanwhile, competitive land use for construction has intensified, a trend that impacts energy consumption, agricultural productivity, and water quantity and quality. Without economically feasible models that address food, energy and water production, sustainable resource management, and cost-effective technologies to reclaim degraded and polluted lands, most regions of China will soon experience severe food, energy, and water security issues.

Similar problems, albeit to a lesser extent, exist in the U.S. and many other countries. Although fundamentally different political and economic systems shape the U.S. and China, the two nations share FEWS trajectories in several complementary ways. For instance, numerous opportunities exist for China and the U.S. to collaborate on agricultural modernization, food and feed security, greenhouse gas-neutral energy production, secure water supply, sustainable megacities and green urbanization, and rural re-development.

The governments of the U.S. and China signed a 10-year Energy and Environment Cooperation Framework in June 2008 to facilitate such joint efforts. Therefore, it is essential to bring together researchers, program leaders, government officials, and industry stakeholders to exchange perspectives, assess risks, continue to identify and refine FEWS research grand challenges, generate opportunities for collaboration in science, technology and policy, and ultimately develop a global FEWS research agenda through engagement with other countries. Such interactions will also accelerate the development and transfer of new technologies between countries, create economic opportunities, and contribute to the development of a diverse, internationally competitive, and globally engaged workforce of scientists and engineers. Such efforts will enable and stimulate public debate, and provide a structured rationale for economic and environmental policy decisions and regulations.

This symposium aims to exchange innovations, share ongoing research, and explore new research and partnerships with industry, government leaders, and non-profit organizations. The format of the symposium will emphasize panel presentations and roundtable discussions designed to optimize networking opportunities and encourage collaboration. Attendees will work face-to-face to develop grant proposals, integrate and narrow research plans, and interact across research groups.
ORGANIZERS AND COMMITTEES

HOST
China-US Joint Research Center for Ecosystem and Environmental Change

ORGANIZING INSTITUTIONS
University of Tennessee
Washington State University
Nanjing University

SUPPORTING AGENCIES
U.S. National Science Foundation (NSF)
National Natural Science Foundation of China (NSFC)

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Hubei University
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Nanjing Agricultural University
Shenyang Agricultural University
Nanjing University of Science and Technology
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Texas A&M University
University of Illinois at Urbana Champaign
Michigan State University
University of Wisconsin Madison
Oregon State University
John Hopkins University
The University of Texas at Austin
Georgia Institute of Technology
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Dr. Tim Rials, University of Tennessee
Dr. Wendy Tate, University of Tennessee
Dr. Jenna Tilt, Oregon State University
Dr. Shihui Yang, Hubei University
Dr. Yangjian Zhang, Chinese Academy of Sciences
Dr. Yan Zhu, Nanjing Agricultural University
Dr. Jie Zhuang, University of Tennessee

CONTACT FOR INFORMATION:
Ms. Sherry Redus, sredus@utk.edu
Dr. Kan Li, likan@nju.edu.cn
Ms. Regan Wagner, rwagne11@vols.utk.edu
PARTICIPANTS

US PARTICIPANTS:

Dr. Meghna Babbar-Sebens
Associate Professor, Water Resources Engineering School of Civil and Construction Engineering
Oregon State University
Email: meghna@oregonstate.edu

Dr. Jefferey Bielicki
Associate Professor, Department of Civil, Environmental and Geodetic Engineering
Ohio State University
Email: bielicki.2@osu.edu

Dr. Jan Boll
Professor, Department of Civil and Environmental Engineering
Interim Director, Center for Environmental Research, Education and Outreach (CEREO)
Washington State University
Email: j.boll@wsu.edu

Mr. Joshua Brugeman
Business Unit Manager, Sustainable Supply Chain
NSF International
Email: jbrugeman@nsf.org

Dr. Julie Carrier
Professor & Department Head, Department of Biosystems Engineering and Soil Science
Institute of Agriculture, University of Tennessee
Email: dcarrier1@utk.edu

Ms. Soomin Chun
PhD student, Environmental Science
Ohio State University
Email: chun.170@buckeyemail.osu.edu

Dr. Dan Cronan
Assistant Professor, Landscape Architecture Program
University of Idaho
Email: dcronan@uidaho.edu

Ms. Melissa Demmit
Student, Department of Ecology and Evolutionary Biology
University of Tennessee
Email: qzz929@mocs.utc.edu

Dr. Ziqian (Cecilia) Dong
Associate Professor, Department of Electrical and Computer Engineering
New York Institute of Technology
Email: ziqian.dong@nyit.edu
Dr. Markus Flury  
Professor, Department of Crop and Soil Sciences  
Washington State University  
Email: flury@wsu.edu

Dr. Bradley Gaolach  
Professor and Director, Metropolitan Center for Applied Research and Extension  
Washington State University  
Email: gaolach@wsu.edu

Dr. David Griffith  
Research Assistant Professor, Center of Resilient Communities  
University of Idaho  
Email: griffith@uidaho.edu

Dr. Baohua Gu  
Corporate Fellow, Oak Ridge National Laboratory  
Email: gub1@ornl.gov

Dr. Fengxiang Han  
Associate Professor, Department of Chemistry  
Jackson State University  
Email: fengxiang.han@jsums.edu

Mr. Eric Helmreich  
Account Manager, Western Washington Region  
Agilent Technologies  
Email: eric_helmreich@agilent.com

Dr. Andrea Hicks  
Assistant Professor, Department of Civil and Environmental Engineering  
University of Wisconsin at Madison  
Email: hicks5@wisc.edu

Dr. Chad Higgins  
Associate Professor, Department of Biological and Ecological Engineering  
Oregon State University  
Email: chad.higgins@oregonsstate.edu

Dr. Mingzhou Jin  
Professor, Department of Industrial and System Engineering  
Director, Institute for a Secure and Sustainable Environment  
University of Tennessee  
Email: jin@utk.edu

Dr. Keith Kline  
Environmental Sciences Division  
Oak Ridge National Laboratory  
Email: klinekl@ornl.gov
Ms. Jacque Klug
Recycled Water Project Manager, King County, Washington
Email: jacque.klug@kingcounty.gov

Dr. Ratten Lal (video presentation)
Distinguished Professor, School of Environment and Natural Resources
Ohio State University
Email: lal.1@osu.edu

Dr. Frank Löffler
Governor’s Chair Professor, University of Tennessee & Oak Ridge National Laboratory
Director, Center for Environmental Biotechnology
Email: frank.loeffler@utk.edu

Ms. Kellie May
Student, Department of Biosystems Engineering & Soil Science
University of Tennessee
Email: kmay10@vols.utk.edu

Ms. Jessica McCord
Program Manager, Center for Renewable Carbon
Institute of Agriculture, University of Tennessee
Email: jfox16@utk.edu

Ms. Kat McDearis
Owner, Kat McDearis MultiMedia LLC
Email: katmcdearis@gmail.com

Ms. Sherry Redus
Program Manager, Institute for a Secure and Sustainable Environment
University of Tennessee
Email: sredus@utk.edu

Dr. Timothy Rials
Professor and Associate Dean, Center for Renewable Carbon
Institute of Agriculture, University of Tennessee
Email: trails@utk.edu

Dr. Steven Ripp
Research Professor, Center for Environmental Biotechnology
University of Tennessee
Email: saripp@utk.edu

Dr. Sarah Ryan
Professor, Department of Industrial and Manufacturing Systems Engineering
Iowa State University
Email: smryan@iastate.edu
Dr. Gary Sayler  
Distinguished Professor Emeritus  
Department of Microbiology and Biosystems Engineering and Soil Science  
Center for Environmental Biotechnology  
University of Tennessee  
Email: sayler@utk.edu  

Dr. Brandi Schottel  
Environmental Engineering & Sustainability Cluster  
Chemical, Bioengineering, Environmental, and Transport Systems (CBET)  
National Science Foundation  
Email: bschotte@nsf.gov  

Dr. Wendy Tate  
Professor, Department of Supply Chain Management  
University of Tennessee  
Email: wendy.tate@utk.edu  

Mr. Jim Thebaut  
President/Executive Producer  
CHRONICLES GROUP, INC  
Email: JamesThebaut@msn.com  

Dr. Jenna Tilt  
Assistant Professor, College of Earth, Ocean and Atmospheric Sciences  
Oregon State University  
Email: tiltj@onid.orst.edu  

Ms. Regan Wagner  
PhD Student, Biosystems Engineering and Soil Science  
University of Tennessee  
Email: rwagne11@vols.utk.edu  

Dr. Mike Wolcott  
Distinguished Professor and Associate Vice President  
Department of Civil and Environmental Engineering  
Washington State University  
Email: wolcott@wsu.edu  

Mr. Matthew Yourek  
PhD student, Washington State University  
Email: matthew.yourek@wsu.edu  

Dr. Jie Zhuang  
Professor, Department of Biosystems Engineering and Soil Science  
Center for Environmental Biotechnology  
Institute for a Secure and Sustainable Environment  
University of Tennessee  
Email: jzhuang@utk.edu
Mr. Mengqi Zhao
PhD Student, Department of Civil and Environmental Engineering
Washington State University
Email: mengqi.zhao@wsu.edu

CHINESE PARTICIPANTS:

Dr. Fengwu Bai
Distinguished Professor, School of Life Science and Biotechnology
Shanghai Jiao Tong University
Email: fwbai@sjtu.edu.cn

Ms. Jing Chen
Program Manager, Division of American and Australian Affairs
Bureau of International Cooperation
National Natural Science Foundation of China (NSFC)
Email: chenjing@nsfc.gov.cn

Dr. Cheng Gu
Professor and Associate Dean, School of the Environment
Nanjing University
Email: chenggu@nju.edu.cn

Dr. Zengqian Hou
Vice President and Distinguished Professor
National Natural Science Foundation of China (NSFC)
Email: houzq@nsfc.gov.cn

Dr. Guibin Jiang
Distinguished Professor and Dean, Research Center for Eco-environmental Sciences
Chinese Academy of Sciences
Email: gbjiang@rcees.ac.cn

Dr. Kan Li
Associate Professor, School of the Environment
Nanjing University
Email: kan_li396@163.com

Dr. Meiling Li
Assistant Professor, Institute of Geographic Science and Natural Resources Research
Chinese Academy of Sciences
Email: liml@igsnrr.ac.cn

Dr. Junguo Liu
Professor and Director, School of Environmental Science and Engineering
Southern University of Science and Technology
Email: liuujg@sustech.edu.cn
Dr. Zhigang Sun  
Assistant Professor, Institute of Geographic Science and Natural Resources Research  
Chinese Academy of Sciences  
Email: sun.zhigang@igsnrr.ac.cn

Dr. Qidong Wang  
Executive Deputy Director General  
Department of Earth Sciences  
National Natural Science Foundation of China (NSFC)  
Email: wangqd@nsfc.gov.cn

Dr. Qiufeng Wang  
Associate Professor, Institute of Geographic Science and Natural resources Research  
Chinese Academy of Sciences  
Email: qfwang@igsnrr.ac.cn

Dr. Bing Wu  
Associate Professor, School of the Environment  
Nanjing University  
Email: bwu@nju.edu.cn

Dr. Fangjie Zhao  
Professor, College of Resources and Environmental Sciences  
Nanjing Agricultural University  
Email: Fangjie.Zhao@njau.edu.cn

Dr. Liang Zhu  
Associate Professor, Department of Environmental Engineering  
Zhejiang University  
Email: felix79cn@hotmail.com

Dr. Yan Zhu  
Professor of Information Agronomy  
Dean, College of Agriculture  
Chief Scientist, National Engineering and Technology Center for Information Agriculture  
Nanjing Agricultural University  
E-mail: yanzhu@njau.edu.cn
**Abbreviated Conference Schedule**

[A detailed Conference Agenda is available separately]

<table>
<thead>
<tr>
<th>Saturday, October 26, 2019</th>
<th><strong>Hotel Check-in</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>6:00 – 8:00 PM</td>
<td>Reception/social Mixer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sunday, October 27, 2019</strong></th>
<th><strong>Continental Breakfast provided at hotel and Registration</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30 – 8:30 AM</td>
<td>Welcome and Opening Remarks</td>
</tr>
<tr>
<td>8:30 – 9:00 AM</td>
<td>Keynote Sessions</td>
</tr>
<tr>
<td>9:00 – 10:00 AM</td>
<td>Coffee Break &amp; Group Photo</td>
</tr>
<tr>
<td>10:00 – 10:30 AM</td>
<td>Keynote Sessions</td>
</tr>
<tr>
<td>10:30 – 12:00 PM</td>
<td>Lunch provided at hotel</td>
</tr>
<tr>
<td>12:00 – 1:00 PM</td>
<td>Funding Opportunities Overview</td>
</tr>
<tr>
<td>1:30 – 2:00 PM</td>
<td>Participant 3-Minute Presentations</td>
</tr>
<tr>
<td>2:00 – 3:00 PM</td>
<td>Group Discussion</td>
</tr>
<tr>
<td>3:00 – 3:30 PM</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>3:30–4:00PM</td>
<td>Participant 3-Minute Presentations</td>
</tr>
<tr>
<td>4:00 – 5:00 PM</td>
<td>Group Discussion</td>
</tr>
<tr>
<td>5:00–5:30PM</td>
<td>Lunch provided at hotel</td>
</tr>
<tr>
<td>6:00 – 8:00 PM</td>
<td>Banquet and cash bar provided at hotel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Monday, October 28, 2019</strong></th>
<th><strong>Continental Breakfast provided at hotel</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30 – 8:30 AM</td>
<td>Three Concurrent Break-Out Sessions</td>
</tr>
<tr>
<td>8:30 – 10:00 AM</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>10:00 10:30 AM</td>
<td>Three Concurrent Break-out Sessions</td>
</tr>
<tr>
<td>10:30 – 10:00 AM</td>
<td>Lunch provided at hotel</td>
</tr>
<tr>
<td>12:00 – 1:00 PM</td>
<td>Session Chair’s Presentations</td>
</tr>
<tr>
<td>1:30 – 2:30 PM</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>2:30 – 3:00 PM</td>
<td>Team Meetings</td>
</tr>
<tr>
<td>3:00 – 4:30 PM</td>
<td>Closing Remarks</td>
</tr>
<tr>
<td>4:30 – 5:00 PM</td>
<td>Conference Concluded</td>
</tr>
<tr>
<td>5:00 – 8:00 PM</td>
<td>Optional Dinner Buffet provided at hotel</td>
</tr>
</tbody>
</table>
JRCEEC: A 12-YEAR RETROSPECTIVE

SUMMARY OF ACTIVITIES

In July 2006, the China-US Joint Research Center for Ecosystem and Environmental Change (JRCEEC) was established to promote international interdisciplinary collaboration between Chinese and US scientists in the research areas of bioenergy and environment. The center’s partners include the University of Tennessee (UT), Oak Ridge National Laboratory (ORNL), Purdue University, three top research institutes in ecology and environment of the Chinese Academy of Sciences (CAS—the powerhouse of science and technology in China), and the University of Science and Technology of China (USTC—a top five comprehensive university in China). Later, annual meetings and many topical workshops were held in China or the US to create and broaden partnership-based collaborations in frontier research areas. Many of the meeting activities were funded by US National Science Foundation (NSF), US Department of Energy (DOE), and National Natural Science Foundation of China (NSFC), and sponsored by industry companies and partnering institutions.

In May 2011, as a milestone, the Center was competitively accepted, along with other US top universities (such as Duke), into the China-US EcoPartnership Program to address environmental sustainability issues between the two nations. This JRCEEC-based, Purdue-led program was jointly managed by the US Department of State (USDOS) and the China National Development and Reform Commission (NDRC), and annually reports to the US-China Annual Strategic and Economic Dialogue (SED—the highest government platform for strategic dialogue between the two nations). In June 2016, the program successfully accomplished its five-year mission and graduated with high marks.

In June 2013, JRCEEC began providing a service to students by organizing summer research internship activities. In summer 2013, two UT Haslam Scholars (Kenna Rewcastle and Imani Chatman) performed eight-weeks of research at the Institute of Applied Ecology, Chinese Academy of Sciences, Shenyang, China, with living stipends covered by the host laboratory and travel expenses jointly covered by the UT Haslam and US NSF programs. In fall 2015, three Chinese graduate students visited Purdue University with support from Purdue. In summer 2016, Hannah Woo and Nannan Jiang (Microbiology PhD students) spent five weeks studying in Beijing and Shenyang, with travel funded by US NSF. In August 2016, the Education Office of the Chinese Embassy offered UT scholarships for two undergraduate students every year to any academic institution in China for summer study. In January 2017, a former visiting student (Xiangfeng Zeng) with UT’s Center for Environmental Biotechnology was invited by USDOS for a two-week visit to Washington DC and US universities and attended the US-China Advanced Forum for Young Scientists (only ten were invited from China). This JRCEEC student exchange program served to enhance communications and mutual understanding for the next-generation of leaders in the US and China.

In October 2014, JRCEEC was awarded a three-year competitive grant by the world’s largest non-profit scholarship organization—CSC—for recruiting outstanding Masters students (10 per year) from China to study at UT for doctorate degrees in the areas of environment and energy. The program, named “China-US Doctoral Environment and Energy Program (DEEP),” plans to recruit 100 PhD students for UT in 10 years and so it is also called the “100-PhD Program.” The DEEP program is based on a MOU, which was signed by UT Chancellors (Cheek and Arrington) and the presidents of three Chinese partnering institutions (China Agricultural University, Nanjing University, and the Institute of Applied Ecology of the Chinese Academy of Sciences) in early 2014. The DEEP program is the first and largest collaborative PhD program between the US and China thus far in the 21st century, with living stipends, medical insurance, and round-trip international air tickets provided by CSC (a total of $22,800 per student per year), out-of-
state tuition covered by a fellowship granted by the UT Chancellors Office, and in-state tuition paid by UT faculty. Thus far, the program has successfully recruited more than 30 PhD students for nine UT departments. The program, a collaboration among approximately 100 UT and 100 Chinese faculty, is rapidly developing, with the support of UT colleges, particularly the AgResearch program. This program was hailed as the best program by the North America Division of CSC in October 2016 to celebrate the 20th anniversary of the founding of the CSC and highlighted as a model of “People-to-People” program at the 2017 China-US Annual Economic and Strategic Dialogue in Washington DC.

In January 2018, the program was successfully renewed after CSC panel review, and the maximum number of scholarship approved by CSC increased from 10 to 15 per year. Meanwhile, the scope of discipline areas was expanded to include food production and security. Participating institutions were extended to include all of the 120 research institutes of the Chinese Academy of Sciences and Nanjing Agricultural University. In 2019, CSC suggested adding a number of 2-year postdoctoral fellowships and/or visiting PhD student scholarships to the program to catalyze and strengthen faculty collaboration for mutually beneficial research.

In October 2016, a new joint Center for Soil Productivity and Environmental Conservation (SPEC) was launched within the framework of JRCEEC and a MOU was signed in June 2016 between UT and Shenyang Agricultural University (SYAU). The SPEC aims to develop long-term innovative scientific collaboration in the areas of soil science and nutrient management through faculty exchanges, student internships, joint curriculum, facility sharing, and even jointly hired faculty. The SPEC was developed from a JRCEEC collaborative research group on biogeochemistry and climate change, which started in January 2013. The collaboration involves a number of other top agricultural institutions, such as the Chinese Academy of Agricultural Sciences, Nanjing Agricultural University, Inner Mongolia Agricultural University, Institute of Applied Ecology, Institute of Soil Science of the Chinese Academy of Sciences, Jilin Agricultural University, Purdue University, and the Environmental Sciences Division of Oak Ridge National Laboratory.

In May 2017, a new grant from the US National Science Foundation was awarded to faculty and scientists at the University of Tennessee (UT) and the Oak Ridge National Laboratory (ORNL). The project supported the development of a Research Coordination Network (RCN), designed to identify transdisciplinary research opportunities for scientists in the US and China focusing on the nexus of food, energy, and water systems (FEWS). This grant, termed “Food-Energy-Water Systems Transdisciplinary Environmental Research Network (FEWSTERN),” partnered with three NSF-China awards to three teams of Chinese institutions, led by Nanjing University, Southern University of Science and Technology, and Remin University of China, respectively, to develop research priorities transcending US and Chinese grand challenges. The first project meeting was held in Nashville on December 6-9, 2017.

To meet the FEWS research needs, in June and November 2017, Joint Research Center for Agricultural Plant Biotechnology (CAPB) and Joint Center for Biomass Science and Technology (CBST) were established to promote US-China collaboration in plant science, forestry, pathology, and bioenergy. Major partners of CAPB and CBST are Nanjing Agricultural University (with a top ten world ranking in agriculture) and Chinese Academy of Forestry (with a top ranking in forestry in China), respectively. These centers include participation by many other institutions, such as Nanjing Forest University, Southwest Forest University, and China Agricultural University.

As a successful and large international partnership, JRCEEC has greatly promoted research networking and collaboration and student training in the areas of environmental sustainability between the US and China. JRCEEC has engaged many central governmental agencies to explore opportunities for joint
programs, such as China’s Ministry of Science and Technology (MOST), Ministry of Agriculture (MOA), and Natural Science Foundation (NSFC), as well as the US Department of Energy (USDOE) and National Science Foundation (NSF). JRCEEC has organized 12 annual academic conferences and 27 topical research workshops, published six special journal issues on focused research topics, five proceedings, and more than 150 joint research papers. It has assisted in preparation of nearly 20 research proposals (40% funded but mostly single-side funding), arranged more than 150 Chinese visiting scholars for 6-24 months of joint research at UT, ORNL, and Purdue University, and coordinated and hosted week-long academic visits for approximately 550 faculty, program managers, and administrators of partnering institutions. The JRCEEC has engaged nearly 5,000 researchers in China and the US and has continuously made advances in the transformation from knowledge exchange into systematic integration of research, education, and stakeholders. The JRCEEC will endeavor to serve as a Union of Science, Technology, and Environmental Policy (U-STEP) during the next decade of its growth by making practical contributions to economy-beneficial international collaborations between these two nations and beyond.

ANNUAL WORKSHOPS

As part of its mission "to promote research collaboration, academic exchange, student education, and technology training and transfer," the China-US Joint Center for Ecosystem and Environmental Change (JRCEEC) holds annual workshops and periodic topical workshops. The following is a summary the workshops held to date:

2018 Annual Workshop—"Advances in Critical Needs for the Nexus of Food, Energy, and Water Systems," Yixing Bamboo International Conference Center, Yixing, Jiangsu Province, China., October 24-28, 2018

2016 Annual Workshop—"International Nexus of Food, Energy, Water, and Soil," Howard Johnson Garden Plaza Hotel, Yixing, China, October 27-29, 2018
2015 Annual Workshop—"Critical Zone Science, Sustainability, and Services in a Changing World," Beck Agricultural Center (Purdue University) and the Holiday Inn Lafayette-City Center, West Lafayette, IN. U.S.A., October 22-24, 2015

2013 Annual Workshop — "Environmental Health and Green Development," Park Vista Hotel, Gatlinburg, Tennessee, USA, November 18-19, 2013


2011 Annual Workshop — "Global Sustainability Issues in Energy, Climate, Water, and Environment," Purdue University, West Lafayette, Indiana (USA), September 26-29, 2011


2008 Annual Workshop — "Bioenergy Consequences for Global Environmental Change," Beijing, China, October 15-17, 2008