Monthly Newsletter for the Biosciences & Environmental Sciences Divisions (B&ESD) May 2014

Pubs and Products

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De Kauwe, M. G., Medlyn, B. E., Zaehle, S., Walker, A. P., Dietze, M. C., Wang, Y.-P., Luo, Y., Jain, A. K., El-Masri, B., Hickler, T., Wårlind, D., Weng, E., Parton, W. J., Thornton, P. E., Wang, S., Prentice, I. C., Asao, S., Smith, B., McCarthy, H. R., Iversen, C. M., Hanson, P. J., Warren, J. M., Oren, R., and R. J. Norby. 2014. Where does the carbon go? A model–data intercomparison of vegetation carbon allocation and turnover processes at two temperate forest free-air CO2 enrichment sites. *New Phytol.* DOI: 10.1111/nph.12847

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Notable Achievements

Boualem Hadjerioua attended the Centre for Energy Advancement through Technological Innovation (CEATI) International conference in Newark, NJ, during May 4th-8th.

On May 5th Dick Flavell of Ceres (http://www.ceres.org/) visited ORNL and to talked Matt Langholtz, Virginia Dale, and others about opportunities and constraints or bioenergy production.

On May 6th the National Climate Assessment (NCA) was released (see more at http://nca2014.globalchange.gov/). The Global Change Research Act of 1990 requires a NCA assessment report at least every four years. Its production was led by the 13 Federal agencies that make up the U.S. Global Change Research Program, and is written by experts drawn from academia; local, state, and Federal government; and the private and nonprofit sectors.

Contributions to the report were made from ORNL by Tom Wilbanks, Ben Preston, Steve Fernandez, Laurence Eaton, and Virginia Dale. The NCA found that not only is global climate changing, but that the major source of change over the past 50 years has been burning of fossil fuels. The report points out recent trends in climate change and increased extreme disturbances and calls for reduced use of fossil fuels that continue to atmospheric concentrations of greenhouse gases. The Forest chapter points out the bioenergy could emerge as a new market for wood that could aid in the restoration of forests killed by drought, insects, and fire.

Anthony Walker presented "Model-data synthesis of ecosystem responses to elevated CO[2]: From deserts to temperate forests of the US." At the Terrestrial Ecosystem Science (TES) & Subsurface Biogeochemical Research (SBR) Principal Investigators (PI) meeting in Washington, DC, during May 6th-7th. Co-authors are Rich Norby, Martin De Kauwe, Belinda Medlyn, and Sönke Zaehle.

Ami Riscassi, a former postdoctoral appointee in the Environmental Sciences Division, has been selected as the 2014 recipient of the Subaru Outstanding Women in Science Award, presented by the Geological Society of America. While at ORNL, Ami conducted field studies to quantify the sources and fluxes of inorganic and methylmercury in East Fork Poplar Creek from a watershed-scale perspective. Ami was nominated by Scott Brooks, and is currently lead scientist with the Shenandoah Watershed Program. Scott nominated Amy in consideration of (1) the significance of her contribution exemplified through publications, (2) the innovation of thought in developing and executing a research plan, and (3) scientific impact through contributing to the solution of complex important problems and leadership and outreach to the community.

The US Department of Energy (DOE) TES/SBR Joint Investigators Meeting was held in Potomac, Maryland May 6th-7th. Baohua Gu gave an invited talk entitled: High-resolution molecular profiling of permafrost soil organic carbon composition and degradation. Gangsheng Wang and Melanie Mayes gave a poster presentation on Microbial dormancy in terrestrial ecosystem models. Alex Johs presented a poster on The Molecular Basis of Mercury Methylation -- Expression, Purification and Characterization of HgcA.

Brennan Smith participated in the DOE Draft Water – Energy Nexus Report in Washington, DC, during May 6th- 7th. The primary goal of the Tech team is to leverage DOE's unique capabilities to develop new knowledge, technologies, and solutions for water-energy specific issues.

Bob Andres also attended the Joint TES/SBR Principal Investigator Meeting in Potomac, MD. He showed a poster entitled, "Temporal, spatial, and uncertainty aspects of carbon dioxide emissions from fossil fuel combustion: highlights of the last two years of TES funding." Bob also was a co-author on one other presentation at the meeting.

Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) manager, Suresh K. SanthanaVannan attended the Alaska Satellite Facility (ASF) User Working Group (UWG) meeting in Fairbanks, AK, during May 6th-7th.

On May 7th Tim Thiess, Matt Langholtz, and Virginia Dale attended the Bioenergy Technologies Office (BETO) quarterly review meeting in Washington, DC.

Patrick O'Connor participated in the Technical Input to Development of Hydro Vision 2015 meeting in Portland, OR, during May 7th-9th.

Brian Davison has been selected as the Division 15C plenary speaker for the 2014 American Institute of Chemical Engineers (AIChE) Annual Meeting that will be held in Atlanta, GA, during November 16th-21st.

During May 7th-12th Colleen Iversen attended a workshop on "Belowground processes and the RhizoNet integrated network of belowground measurements" at the Chinese Academy of Sciences Institute of Geographic Sciences and Natural Resources Research in Beijing, China. On May 10th she gave a keynote address at a large RhizoNet Symposium entitled "Digging deeper: Improving our understanding of ecosystem responses to climate change through measurements and modeling of belowground processes."

During May 11th-15th Jerry Tuskan was invited to Pacific Northwest National Laboratory (PNNL) to be a member of the Biosystems Dynamics and Design proposal review panel.
He also participated in the expression quantitative trait loci (EQTL) sampling trip while in Richland, Washington.

In Beijing, China, on May 12th, Rich Norby gave a presentation on "The Old-Field Community Climate and Atmonspheric Manipulation (OCCAM) experiment: Was a multi-factor experiment the best approach for revealing responses to atmospheric and climatic change?" and presented a poster on "Vegetation turnover and nitrogen feedback drive temperate forest carbon sequestration in response to elevated CO_2: A multi-model analysis" (Anthony Walker *et al.*) at the INTERFACE workshop, "Using results from global change experiments to inform land model development and calibration."

During May 12th-14th Udaya Kalluri participated in a panel review in the DOE Plant Feedstock Genomics for Bioenergy Review.

During May 12th-15th Rebecca Efroymson and Natalie Griffiths presented at the Symposium on Forestry Best Management Practice (BMP) Effectiveness in the Eastern U.S. in Blacksburg, VA. Rebecca's presentation, coauthored with Virginia Dale, was entitled "Evaluating best management practices for environmentally sustainable bioenergy production." Natalie Griffiths presented a talk titled "Assessing BMP effectiveness for woody biomass production for bioenergy in groundwater-dominated Coastal Plain watersheds."

Gangsheng Wang gave an invited talk at the US DOE Climate Modeling PI Meeting Breakout session in Potomac, Maryland, during May 12th-15th. His talk was entitled: Assessing representation of microbial-enzyme functions in terrestrial ecosystem models.

John Smith and Allison Fortner attended the Joint Aquatic Sciences Meeting, Portland, OR, during May 18th-23rd. John presented a talk entitled, "Cross-ecosystem flux of selenium by emerging mayflies downstream of a coal ash spill;" coauthors include T.F. Baker, R.T. Jett. Allison presented a talk entitled, "Trophic transfer of selenium at a coal ash spill site;" coauthors include J.G. Smith, J.G. Morris, R. Otter, F. Bailey, S.M. Adams, T.J. Mathews.

Natalie Griffiths also presented at the Joint Aquatic Sciences Meeting in Portland, OR. Her presentation was titled "Vertical profiles of peat pore water chemistry in an ombrotrophic peatland and expected vulnerabilities to climate change."

Jay Chen and Wellington Muchero have been working with the Environmental Molecular Sciences Laboratory (EMSL) on two user proposal projects: “Detection and Quantification of Strigolactones in Populus” and “High Resolution Cell Wall Structure and Polymer Analysis of Populus Natural Variants.” Jay and Wellington visited EMSL on May 19th and 20th, met with EMSL scientists, presented seminars entitled "Populus as a model system for bioenergy and plant-microbe interaction studies" and discussed future collaboration.

Brennan Smith and Shih-Chieh Kao were mentioned in the American Society of Civil Engineers magazine. The article “Nation’s Streams Hold Hydropower Potential” is available online at http://www.asce.org/cemagazine/Article.aspx?id=23622330873#.U8g7F41dXtU.

Patrick O’Connor attended the Hydropower Vision Coordination and Analysis meeting in Washington, DC, during May 13th-14th.

Udaya Kalluri was invited to join the joint U.S. Department of Agriculture-U.S. Department of Energy’s review panel on “Plant Feedstocks Genomics for Bioenergy” held May 13th-14th in Rockville, MD.

A Seed proposal submitted by Bob Standaert and Pat Collier (PI) was recommended for funding.

On May 15th Nate Pollesch gave a presentation on “Mathematical Approaches to Bioenergy Sustainability Assessment” at the University of Tennessee.

Brennan Smith attended the Research & Development meeting in Denver, CO, during May 15th-16th.

The poster “Bioproduction of ZnS Nanoparticles with Copper Doping for Tunable Emissions” was presented at the 2014 Annual Meeting of American Society of Microbiology (ASM), during May 17th-20th in Boston, MA. The author list include Moon, J.-W., Ivanov, I. N., Joshi, P. C., Jung, H., Rondinone, A.J., Jellison, G. E., Jr., Armstrong, B.L., Jang, G.G., Wang, W., Duty, C.E., and T. J. Phelps.

During May 17th-20th Dale Pelletier and Nathan Cude also attended the ASM Conference in Boston, MA. They presented a poster titled “A Protocol for the Enrichment of Live Bacterial Endophytes from Populus deltoides for Metagenomics and Single-Cell Genomics.”

The paper, ““Collection of Airborne Particles by a High Gradient Permanent Magnetic Method,” coauthored by Meng-Dawn Cheng, Gerard Ludtka, and others has been awarded Best Paper in the 2014 Global Security Directorate (GSD) Best Paper Competition. The papers were judged on professionalism in design, clarity, logical argumentation and readability, demonstration of technical prowess, placement of the technical insights into a larger tactical or strategic perspective, thought leadership, and succinctness.

Rich Norby gave a presentation on "How to Start a Big Experiment" at the 5th International Forum for Young Ecologists in Kaifeng, China, on May 16th.

The poster "Semantic search integration to climate data" was presented at the 2014 International Conference on Collaboration Technologies and Systems (CTS), May 19th-23rd in Minneapolis, MN. Coauthors were Devarakonda, R., Palanisamy, G., Pouchard, L. C., and B. Shrestha. Read more online at http://cts2014.cisedu.info/.

On May 19th, at the request of Brennan Smith, Marian Muste, University of Iowa, visited ORNL and presented "Documentation of river hydro-morphodynamics using acoustic instruments."

Alex Johs presented the invited talk, "The interactions of biological macromolecules with metals revealed by neutron and X-ray scattering techniques, at the 2014 Joint National Synchrotron Light Source (NSLS/NSLS-II) & Center for Functional Nanomaterials (CFN) Joint Users' Meeting at Brookhaven National Laboratory from May 19th-21st. Alex provided a general overview of the Mercury Science Focus Area (SFA) at ORNL and discussed some specific examples of how neutrons and X-rays can be used to reveal how metals interact with biological systems.

Udaya Kalluri joined the Advisory Board of School of Forest Resources and Environmental Sciences, Michigan Technological University, her Alma Mater.

On May 20th Yetta Jager discussed a new approach to optimizing biodiversity and bioenergy with Sam Evens at the Energy Biosciences Institute at the University of California, Berkeley. Plans are to implement a similar approach using Billion-Ton Update (BT2) assumptions and other refinements.

Data scientists Ranjeet Devarakonda, Giri Palanisamy, and Biva Shrestha with the Climate Change Science Institute (CCSI) at ORNL and collaborators with the US Department of the Interior United States Geological Survey (USGS) have jointly developed the USGS Science Data Catalog (http://data.usgs.gov/datacatalog/) for earth science data. The catalog service allows users to efficiently browse and discover USGS datasets through searches by keyword, data source, scientist name, or geographic information system. The catalog¹s records describe datasets, data collections, and observational or remotely sensed data stored in national systems. Some collections in the catalog contain information dating as early as the 17th century. The USGS created the catalog to meet the requirements of a May 2013 executive order that called for all government-funded data to be freely available to the public, easy to find, accessible, and usable. Building upon an earlier interagency memo released by the White House¹s Office of Science and Technology Policy, the executive order¹s implementation was guided by an Office of Management and Budget policy and Project Open Data (http://www.whitehouse.gov/blog/2013/05/16/introducing-project-open-data), a public data repository introduced by the White House on the open-source platform, GitHub.

During May 20th-22nd several staff from ORNL participated in a workshop at the International Maize and Wheat Improvement Center (commonly called by its Spanish acronym CIMMYT for Centro Internacional de Mejoramiento de Maíz y Trigo). The focus was on collaboration opportunities between ORNL and CIMMYT. Virginia Dale spoke on "Environmental and Socioeconomic Indicators for Sustainability." Jay Gulledge spoke on "Environmental and Socioeconomic Indicators for Sustainability" and "Impact, Adaption and Vulnerability Research

Science." Raju Vatsavai and Suresh SanthanaVannan spoke on "Environmental Data Science Systems." Bhudu Bhaduri spoke on "Knowledge Discovery Framework," and Yarom Polsky spoke on "Sensors and Controls Research."

Amy Wolfe gave a seminar entitled, "Risk and escape policies, perspectives, & practices: Issues & implications for synthetic biology R&D on microbes, algae, & plants" at the Center for Nanotechnology in Society at the University of California Santa Barbara (UCSB) on May 20th. Amy was invited to UCSB to discuss research funded by the DOE Office of Science Genomic Science Program in the seminar and a series of other interactions with graduate students and faculty.

Rich Norby, Melanie Mayes, and Forrest Hoffman participated in a Next-Generation Ecosystem Experiments (NGEE)-Tropics planning workshop, Berkeley, CA, during May 21st-22nd.

Amy Wolfe and colleagues Elizabeth Malone (PNNL), Rick Diamond (Laurence Berkeley National Laboratory [LBNL]), Christopher Payne (LBNL), John Goins (PNNL), and John Reed (Energetics) briefed Timothy Unruh, the Director of DOE-Energy Efficiency and Renewable Energy's Federal Energy Management Program, on May 22nd in Washington, DC about this "institutional change" team's activities. The Federal Energy Management Program (FEMP) Institutional Change team integrates social science and technology to help organizations achieve their missions through energy management excellence. The team also met with FEMP sponsor Jerry Dion, and Amy met separately with Hayes Jones (FEMP Supervisor, Operations) and Chip Goyette (FEMP Energy Savings Performance Contracts Process Improvement).

The DOE Biological and Environmental Research (BER) publication, Research Priorities for Tropical Ecosystems Under Climate Change, has won "Best of Show" in the Society for Technical Communication (STC) International Summit Competition. Team members of Oak Ridge National Laboratory's (ORNL) Biological and Environmental Research Information System (BERIS), who served as rapporteurs, writers, editors, and designers, prepared the report for publication by DOE BER. Prior to being named Best of Show, this communication tool was first judged Distinguished, the highest level and one of only six presented.
Open discussions at the Research Priorities for Tropical Ecosystems Under Climate Change Workshop were used "to identify critical scientific gaps that limit the ability to represent tropical ecosystems in Earth system models." Before entry in the international competition, the report was awarded Best of Show, Print, and Distinguished in Informational Materials, Technical Reports, from the Washington, DC-Baltimore Chapter's 2013–2014 Summit Competition. (Over the past 24 years, the BERIS strategic science communication group has received some 80 awards, including 5 Best of Shows, 18 Distinguished, and 28 Excellence in local and international competitions).
During the May STC International Summit Conference, Judy Wyrick, a BERIS team member since 1989, accepted the award for BERIS and the report's distinguished international writing team at the Summit's Honors Banquet. In addition to professional training and education, the Summit is the "premier event" for unveiling and demonstrating new products, services, and technologies to the world of technical communication.
BERIS team awardees are Kris Christen (science writer/editor), Holly Haun (technical editor/writer), Sheryl Martin (QC text reviewer/webmaster), Marissa Mills (communications and marketing outreach strategist /webmaster), Judy Wyrick (editor/document designer/print production manager/25-year STC member), Betty Mansfield (group leader/research interface),

and Creative Media's Brett Hopwood and LeJean Hardin (illustrators/document designers). Writing team contributors include ORNL's Richard Norby and DOE BER's Daniel Stover and Mike Kuperberg. Other awardees include representatives of governmental and academic institutions (Jeffrey Chambers, Rosie Fisher, Jefferson Hall, Steven Wofsy, and the Tropical Ecosystems writing team.)
Competitions have two tiers: local (chapter) and international (Society-wide) levels and are open to all technical communication professionals, not just STC members. Entry submitters receive judging comments that are used for self-evaluation and planning future products. STC is the world's largest and oldest professional association dedicated to the advancement of the field of technical communication, with 7,000 members in almost 50 countries. STC advances the practice and theory of technical communication and promotes the value of technical communicators globally across all user abilities and media so that both businesses and customers benefit from safe, appropriate, and effective use of products, information, and services. Technical communication is an essential part of every organization's competitive strategy.

On May 27th Yetta Jager discussed possible future collaboration with Daniel Moriasi at the US Department of Agriculture (USDA) Grazinglands Research Laboratory for the Pathways to Sustainability project/subtask. This laboratory operates two Conservation Effects Assessment Project (CEAP) watersheds (Little Washita and Fort Cobb Lake) in Oklahoma at the front where irrigation becomes necessary for row crops. The research focus will be on the interface where irrigation becomes an economic driver for choosing switchgrass over winter wheat and/or other crops.

Sindhu Jagadamma was featured in the May 27th ENERGY.GOV Women @ Energy Series. The article is available online at http://energy.gov/diversity/articles/women-energy-sindhu-jagadamma.

During May 28th-30th Scott Retterer attended The 58th International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN) in Washington, DC. He was invited to serve on the program committee where members were asked to review papers, and help in other conference activities, such as encouraging submissions, circulating information, suggesting keynote speakers, etc.

On May 29th Maggie Davis met with Adam French and William Capehart of the South Dakota School of Mines and Technology to discuss ORNL's land use change research and the connection to increases in extreme weather events and potential collaborations with the Climate Change Science Institute.

Jenny Morrell-Falvey was invited to give a presentation at the Vanderbilt University School of Medicine Annual Career Symposium, "Exploring Avenues to Careers in Academia." She was asked to talk about her career experiences in imaging techniques to investigate molecular interactions, what her job entails, how she got there, and her advice for young scientists. She also met with staff members at Vanderbilt University.

Eric Pierce attended the National Research Council of the National Academies Committee Meeting on Geological and Geotechnical Engineering at the Keck Center in Washington, DC on May 29th-30th.

BESD New Arrivals

Emma Centurion has joined the ESD's Energy-Water Resource Systems Group of the Environmental Sciences Division as a Higher Education Research Experiences (HERE) student. Emma will be helping with data transfer and sorting of the DOE/Electric Power Research Institute (EPRI) reports which contain detailed cost and design for 240-270 small hydropower projects.

Elliot Consoli (Oak Ridge Institute for Science and Education [ORISE]/HERE) arrived in May and will work with Jenny Morrell-Falvey in BSD's Biological and Nanoscale Systems Group.

Ethan Hopping has joined the ESD's Energy-Water Resource Systems Group as a HERE student. Ethan will assist with data collection and analysis with the Modular Pumped Storage (M-PSH) project. Prepare and help senior staff with the development of the PowerPoint presentations for Hydro Vision International conference and for DOE-HQ. Help with the end of year M-PSH draft report.

Josh Lucheon (ORISE/HERE) arrived in May and will work with Scott Retterer in BSD's Biological and Nanoscale Systems Group.

Stephen Signore has joined ESD's Energy-Water Resource Systems Group as a post-Doctoral student. Stephen will support hydropower flow measurement (HFM) research, development, and demonstration (RDD) collaboration that will enable U.S. hydropower assets to produce more energy from available water. The over-arching objective of the activities are that HFM technology, and a quantitative site-specific methodology to evaluate the costs and benefits of that technology, will be available for every turbine type in the U.S. hydropower fleet. Stephen will be supporting development of a methodology and calculation tool for more refined estimates of costs and benefits of such widespread deployment.

Gang Zhao has joined the ESD's Energy-Water Resource Systems Group as a HERE student. Gang will support Bibi Naz and Shih-Chieh Kao to set up reservoir simulation module for the Distributed Hydrology Soil Vegetation Model (DHSVM). The new function will be utilized to support the climate change impact assessment on the US federal hydropower system.