

**Monthly Newsletter for the  
Biosciences & Environmental Sciences Divisions (B&ESD)  
December 2012**

**Pubs and Products**

Abraham, P., Giannone, R. J., Adams, R. M., Kalluri, U., Tuskan, G. A., and R. L. Hettich. 2013. Putting the pieces together: High-performance LC-MS/MS provides network-, pathway-, and protein-level perspectives in *Populus*. *Molec. Cell. Proteom.* 12: 106-119.

Kridelbaugh, D. M., Nelson, J., Engle, N. L., Tschaplinski, T. J., and D. E. Graham. 2013. Nitrogen and sulfur requirements for *Clostridium thermocellum* and *Caldicellulosiruptor bescii* on cellulosic substrates in minimal nutrient media. *Bioresource Technol.* 130: 125-135.

Lam, P. S., Tooyserkani, Z., Naimi, L. J., and S. Sokhansanj. 2012. Pretreatment and pelletization of woody biomass. In Z. Fang (Ed.), *Pretreatment Techniques for Biofuels and Biorefineries* (pp. 93-116). New York, NY: Springer.

Le Quéré, C., Andres, R. J., Boden, T., Conway, T., Houghton, R. A., House, J. I., Marland, G., Peters, G. P., van der Werf, G., Ahlström, A., Andrew, R. M., Bopp, L., Canadell, J. G., Ciais, P., Doney, S. C., Enright, C., Friedlingstein, P., Huntingford, C., Jain, A. L., Jourdain, C., Kato, E., Keeling, R. F., Klein Goldewijk, K., Levis, S., Levy, P., Lomas, M., Poulter, B., Raupach, M. R., Schwinger, J., Sitch, S., Stocker, B. D., Viovy, N., Zaehle, S., and N. Zeng. 2012. The global carbon budget 1959-2011. *Earth Syst. Sci. Data Discuss.* 5: 1107-1157.

Mathews, T., Southworth, G., Peterson, M. J., Roy, W. K., Ketelle, R. H., Valentine, C., and S. Gregory. 2013. Decreasing aqueous mercury concentrations to meet the water quality criterion in fish: examining the water-fish relationship in two point-source contaminated streams. *Sci. Total Environ.* 443: 836-843.

Patton-Mallory, M., Skog, K. E., and V. H. Dale. 2012. Integrated forest biorefineries: Sustainability considerations for forest biomass feedstocks. In L. Christopher (Ed.), *Integrated Forest Biorefineries* (pp. 38-55). Royal Society of Chemistry: London, England.

Peters, G. P., Andrew, R. M., Boden, T., Canadell, J. G., Ciais, P., Le Quéré, C., Marland, G., Raupach, M. R., and C. Wilson. 2013. The challenge to keep global warming below 2°C. *Nat. Clim. Chang.* 3: 4-6.

Podkaminer, K. K., Guss, A. M., Trajano, H. L., Hogsett, D. A., and L. R. Lynd. 2012. Characterization of xylan utilization and discovery of a new endoxylanase in *Thermoanaerobacterium saccharolyticum* through targeted gene deletions. *App. Environ. Microbiol.* 78: 8441-7.

Wullschleger, S. D., Weston, D. J., DiFazio, S. P., and G. A. Tuskan. 2012. Revisiting the sequencing of the first tree genome: *Populus trichocarpa*. *Tree Physiol.* Available online. DOI: 10.1093/treephys/tps081

Ye, C.-Y., Li, T., Yin, H., Weston, D. J., Tuskan, G. A., Tschaplinski, T. J., and X. Yang. 2012. Evolutionary analyses of non-family genes in plants. *Plant J.* Available online. DOI: 10.1111/tbj.12073

### Notable Achievements

A team of university and national laboratory scientists (David Graham, Tatiana Vishnivetskaya, Stan Wullschleger, Larry Hinzman, Joel Rowland, and Vladimir Romanovsky) from the Next-Generation Ecosystem Experiments (NGEE Arctic) project, sponsored by the U.S. Department of Energy (DOE) Office of Science, traveled to Russia to discuss common research interests in permafrost-dominated ecosystems. The scientists from the U.S. and Russia met at the Russian Academy of Sciences, Moscow on November 8<sup>th</sup>-9<sup>th</sup> to identify critical knowledge gaps in our understanding of carbon cycle processes in arctic landscapes as a significant greenhouse gas feedback to climate. Session topics included (1) thermal state of permafrost in Arctic regions, (2) microbial dynamics in the active layer and upper permafrost, and (3) thermokarst, thermal erosion, and other land surface processes in response to a changing climate. Stan, Vladimir, and Tatiana presented topics on thermal state and erosion of permafrost, its distribution, and study of microbial life in permafrost using next generation sequencing.

Natalie Griffiths attended the Berkeley Catchment Science Symposium and the American Geophysical Union (AGU) Fall Meeting during December 2<sup>nd</sup>-7<sup>th</sup>. At AGU, she presented a poster on the “Biogeochemistry of forested watersheds in the Southeastern U.S. prior to the conversion to short-rotation pine for bioenergy” with co-authors Mulholland, Jackson, McDonnell, Blake, Du, Klaus, and Langholtz.

On December 3<sup>rd</sup> the research team from the short-rotation woody biomass sustainability project presented three posters at the AGU Conference in San Francisco, CA:

- Jackson, C. Rhett, Enhao Du, Julian Klaus, Natalie A. Griffiths, Jeffrey J. McDonnell, and John I. Blake. 2012. Whole hillslope irrigation reveals differential interflow behavior of dye tracers, conservative solutes and nutrients.
- Du, Enhao, C. Rhett Jackson, John I. Blake, Natalie A. Griffiths, Julian Klaus, Jeffrey J. McDonnell, Kellie Vache, and Matthew H. Langholtz. 2012. Modeling water quality within biofuel production landscapes: integrating hillslope flow paths, deep groundwater dynamics, riparian groundwater interactions, and end-member chemistry.
- Griffiths, Natalie A., Patrick J. Mulholland, C. Rhett Jackson, Jeffrey J. McDonnell, John I. Blake, Enhao Du, Julian Klaus, and Matthew H. Langholtz. 2012. Biogeochemistry of forested watersheds in the Southeastern U.S. prior to conversion to short-rotation pine for bioenergy.

Bob Andres also attended the AGU 45<sup>th</sup> annual Fall Meeting and presented the poster, “How a new uncertainty estimate of global carbon dioxide emissions from fossil fuel consumption affects our understanding of the source/sink nature of the terrestrial biosphere,” with co-author T. Boden of the Carbon Dioxide Information Analysis Center (CDIAC). Bob also was a co-author on four other presentations at the meeting.

The three following posters were also presented at the AGU Fall Meeting:

- Vishnivetskaya T.A., Stackhouse B.T., Sanders R.L., Lau C.Y.M., Saarunya G.S., Murphy J.R., Williams D.E., Layton A.C., Pfiffner S.M., Phelps T.J., Whyte L. and Onstott T.C. Metagenomic analyses of active-layer and permafrost microbial communities during short-term thawing.
- Stackhouse B.T.; Mykytczuk N.C.; Lamarche-Gagnon G.; Layton A.C.; Pfiffner S.M.; Vishnivetskaya T.A.; Saad N.; Whyte L.; Onstott T.C. Long Term Thawing Experiment

- on High Arctic Polygonal Tundra: Spring Thaw Gas Flux Dynamics and Soil Properties.
- Lau C.Y.M.; Stackhouse B.T.; Chourey K.; Hettich R.L.; Vishnivetskaya T.A.; Pfiffner S.M.; Layton A.C.; Mykytczuk N.C.; Whyte L.; Onstott T.C. Identifying active methane-oxidizers in thawed Arctic permafrost by proteomics.

On December 3<sup>rd</sup> Maggie Davis and Keith Kline submitted a proposal under the special call for joint research from Oak Ridge National Laboratory (ORNL) and the Brazilian Research Institute of Sao Paulo (FAPESP). The project would contribute to collaborations with Brazil on bioenergy sustainability.

During December 3<sup>rd</sup>-5<sup>th</sup> Keith Kline and Maggie Davis participated in multiple calls, exchanges and meetings with the U.S. delegation to the International Organization for Standardization (ISO) PC248 to discuss strategies regarding the committee draft of the standard. The U.S. comments were finalized and formally submitted on December 6<sup>th</sup>. After receiving the list of comments received from other national bodies, ORNL participated in further conference calls with U.S. delegates to prepare strategies for the meeting in Australia.

On December 5<sup>th</sup> Keith Kline presented, “Cooperation on Sustainability Standards” for the U.S. DOE Biomass Program public webinar “Global Solutions for Global Challenges: International Collaborations to Advance Bioenergy Research.” Over 145 people attended with registrations from many countries – Finland, Canada, the UAE, Italy, Paraguay, Lithuania, Taiwan, South Korea, Germany, South Africa, and Saudi Arabia. The presentations are posted on the Biomass website at [www.eere.energy.gov/biomass/webinars.html](http://www.eere.energy.gov/biomass/webinars.html).

Brennan Smith and Shih-Chieh Kao attended a DOE Vision Program meeting at the National Wind Technology Center (NWTC) at the National Renewable Energy Laboratory (NREL) in Denver, CO, during December 5<sup>th</sup>-7<sup>th</sup>.

Boualem Hadjerioua went to Vanderbilt University (Nashville, TN) on December 7<sup>th</sup> to discuss the Cumberland Water Quality Modeling Project.

Boualem Hadjerioua attend the Hydro Vision 2013 Committee Meeting in Orlando, FL, during December 9<sup>th</sup>-10<sup>th</sup> to help plan the upcoming HydroVision 2013 International Conference.

ORNL Distributed Active Archive Center (DAAC) Deputy Manager, Tammy Walker Beaty, participated in the Earthdata Usability Study Final Presentation on Monday, December 10<sup>th</sup>.

During December 10<sup>th</sup>-14<sup>th</sup> Keith Kline assisted as an external reviewer of the Sustainability Research Program at Brazil’s Center for Technology of BioEthanol (CTBE) in Campinas Sao Paulo. He also met with colleagues from the Copernicus Institute (Netherlands) and continued developing plans for the Global Sustainability of Bioenergy (GSB) project.

ORNL DAAC User Services Lead, Jim Lay, and Tammy Walker Beaty participated in the 2012 American Customer Satisfaction (ACSI) briefing to the Earth Observing System Data and Information Center (EOSDIS) User Services Working Group (USWG) on Tuesday, December 11<sup>th</sup>.

Tammy Walker Beaty also participated in the Standards Process Group monthly telecon on Tuesday, December 11<sup>th</sup>.

December 11<sup>th</sup> and 14<sup>th</sup> Maggie Davis assisted in convening 2 final Working Group 4 webinars to finalize the WG4 annotated bibliography designed to update the PC on scientific research related to indirect effects. Davis and the WG4 conveners are now preparing for the presentation and discussion of this research during the upcoming plenary meeting in January 2013.

Suresh K. SanthanaVannan replaced Chris Lenhardt as ORNL DAAC Manager on December 12<sup>th</sup>. Chris is moving to Chapel Hill/Raleigh, NC, to take the position of Director of Strategic Development at the University of North Carolina at Chapel Hill (UNC-CH) Renaissance Computing Institute (RENCI, <http://www.renci.org>). Suresh came to ORNL in March of 2005 from the University of Maryland where he received a Masters degree in Meteorology.

ORNL DAAC Manager, Suresh K. SanthanaVannan, ORNL DAAC Chief Scientist, Bob Cook, and Tammy Walker Beaty received approval for the ORNL DAAC FY2013-FY2-14 Work Plan through a telecon with Earth Science Data and Information System (ESDIS) Management on Wednesday, December 12<sup>th</sup>.

Tammy Walker Beaty and ORNL DAAC Systems Engineer, Ben McMurry, participated in the ORNL “Deep Dive” Usability Discussion with Blink on Thursday, December 13<sup>th</sup>.

Bob Cook and ORNL DAAC Developer, Yaxing Wei, participated in a telecon with personnel associated with DataONE and the EarthCube Brokering Group to discuss the potential integration of brokering technology into the cyber infrastructure of DataONE to enable a more flexible mechanism for the integration and distribution of heterogeneous data resources.

Tammy Walker Beaty also participated in the Coherent Web Phase II Weekly Telecon on Thursday, December 13<sup>th</sup>.

On December 13<sup>th</sup>-14<sup>th</sup> Boualem Hadjerioua met with Politano Marcela and her team in Iowa City, IA, to discuss a potential collaboration on the Total Dissolved Gas.

On December 14<sup>th</sup> Rebecca Efroymsen and Virginia Dale attended the workshop “Data needs and testing methods for assessing the safety of a field release of synthetically designed algae for biofuel production,” co-sponsored by the U.S. Environmental Protection Agency (EPA) Office of Pollution Prevention and Toxics, Woodrow Wilson Center, and Massachusetts Institute of Technology Synthetic Biology Engineering Research Center.

ORNL DAAC staff participated in the Climate Change Science Institute (CCSI) All Hands Meeting on Friday, December 14<sup>th</sup>.

Bob Cook and ORNL DAAC Data/Metadata Coordinator Les Hook meet with internal DAAC staff associated with the North American Carbon Program (NACP) on Friday, December 14<sup>th</sup>, to review and discuss documentation, metadata, and data assembly for NACP synthesis related data sets to be archived at ORNL DAAC.

Amy Wolfe, Virginia Dale, and Rebecca Efroymsen were invited participants at a workshop entitled, "Data needs and testing methods for assessing the safety of a field release of synthetically designed algae for biofuel production," held at the Woodrow Wilson Center in Washington, DC, on December 17<sup>th</sup>. Bruce Tonn also was an invited participant through his appointment at the University of Tennessee. The workshop was co-sponsored by the U.S. EPA's

Office of Pollution Prevention and Toxics, Woodrow Wilson Center, and Massachusetts Institute of Technology Synthetic Biology Engineering Research Center (SynBERC).

ORNL DAAC Chief Scientist, Bob Cook, participated in the DataONE External Advisory Board Project Meeting during December 17<sup>th</sup>-18<sup>th</sup> in Washington, DC.

During December 18<sup>th</sup>-19<sup>th</sup> Brennan Smith attended a meeting at DOE headquarters in Washington, DC, to discuss annual operating plan modification requests for conventional hydropower (CH) and the marine and hydrokinetic (MHK) technology database (TD).

On December 19<sup>th</sup> D.K. Lee, Assistant Professor and Extension Agronomist at the University of Illinois at Urbana Champaign visited ORNL and was hosted by Laurence Eaton. He presented “Diversifying Cellulosic Bioenergy Feedstocks with Native Prairie Grasses.”

On December 20<sup>th</sup> local news station WBIR presented a news story focusing on Mark Bevelhimer’s latest research in the Aquatic Ecology Laboratory. See it online at <http://www.wbir.com/news/article/246425/2/ORNL-scientists-working-to-ensure-future-power-sources-dont-harm-wildlife>.

The Young Evolving Scientists Seminar Series (YESSS) held a meeting on December 20<sup>th</sup>, featuring an informal talk by Rebecca Efroymsen, Staff Scientist in the Environmental Sciences Division (ESD). Rebecca shared information on her career path and offered tips/suggestions for achieving career success at ORNL. YESSS would like to thank Tony Palumbo, Division Director for the Biosciences Division (BSD) who sponsored the refreshments for the meeting. YESSS is a professional support group for early career science professionals (at all levels) within BSD/ESD research programs. The meetings are held the 3<sup>rd</sup> Thursday of each month at noon in Building 1505, Room 189. Please visit the YESSS website for more information and to join the email list: <http://home.ornl.gov/general/yesss>.

Boualem Hadjerioua visited the Earth By Design (EBD) 45-mile project: Turbinator in Portland, OR, during December 20<sup>th</sup>-21<sup>st</sup>.

On December 21<sup>st</sup> ORNL finalized and distributed an annotated bibliography in fulfillment of the ISO PC 248 Resolution 06/2012: “ISO/PC 248, following resolution 05/2012, reinstates WG 4 with the specific mandate to inform the PC at the next plenary on new scientific research including issues surrounding definitions, system boundaries and responsibilities relevant to the issue of indirect effects.” ORNL submitted 11 of the 16 journal articles included in the annotated bibliography as well as compiled and edited the document in coordination with an internal ISO PC248 review committee.

### **BESD New Arrivals**

Daniel Close reported to work as a new staff member in December, working with David Graham in the Biosciences Division’s (BSD) Microbial Ecology and Physiology group.

Elizabeth Herndon arrived in December to work as a postdoctoral research associate with Liyuan Liang. She will work on the Next-Generation Ecosystem Experiments (NGEE) Biochemistry task with a focus on organic carbon characterization, carbon-mineral interaction, water chemistry in the thawed permafrost pores, etc. Further, NGEE has an approved Environmental Molecular

Sciences Laboratory (EMSL) proposal and she expected to conduct some studies using the facility in FY13.

Donna Kridelbaugh and Stuart McCullough will start work in January as Operation Project Managers with David Fowler and Steve Cline in the Energy and Environmental Sciences Directorate (EESD) Operations Support Group. Donna Kridelbaugh has a background in the life sciences with lab management/teaching experience and previously worked as a post-Master's research associate in BSD. Stuart McCullough brings a background in project management, nuclear industry and health and safety to the group. He has worked as a project engineer for over ten years at ORNL. Both Donna and Stuart will be located on the first floor of Building 1505 and look forward to supporting researchers within BSD and the Environmental Sciences Division (ESD).

Benjamin Mann arrived in December to work as a postdoctoral research associate with Baohua Gu. Benjamin will work with a multidisciplinary research team investigating coupled geochemical and microbiological processes that influence the transformation and interactions of natural organic macromolecules with implications to soil carbon degradation and contaminant reactivity.

Xia (Sophia) Song arrived in December to work as postdoctoral research associate with Tom Boden. She will work with the Carbon Dioxide Information Analysis Center (CDIAC) to inventory the soil respiration data and leaf area indices submitted to CDIAC by AmeriFlux investigators, evaluate the quality and consistency of the data, prepare data for ingest into the CDIAC AmeriFlux Structured Query Language (SQL) database, and check the data values provided by investigators.