

**B&ESD Newsletter**  
**January 2012**

**Pubs and Products**

Abraham, P., Adams, R., Giannone, R. J., Kalluri, U., Ranjan, P., Erickson, B., Shah, M., Tuskan, G. A., and R. L. Hettich. 2011. Defining the boundaries and characterizing the landscape of functional genome expression in vascular tissues of *Populus* using shotgun proteomics. *J. Proteome Res.* 11: 449-460.

Dunbar, J., Eichorst, S. A., Gallegos-Graves, L., Silva, S., Xie, G., Hengartner, N. W., Evans, R. D., Hungate, B. A., Jackson, R. B., Megonigal, J. P., Schadt, C. W., Vilgalys, R., Zak, D. R., and C. R. Kuske. 2012. Common bacterial responses in six ecosystems exposed to ten years of elevated atmospheric carbon dioxide. *Environ. Microbiol.* Available online. DOI: 10.1111/j.1462-2920.2011.02695.x

Garten, C. T., Jr. 2011. Review and model-based analysis of factors influencing soil carbon sequestration beneath switchgrass (*Panicum virgatum*). *Bioenergy Res.* Available online. DOI:10.1007/s12155-011-9154-2

Gillette, D. P., Fortner, A. M., Franssen, N. R., Cartwright, S., Tobler, C. M., Wesner, J. S., Reneau, P. C., Reneau, F. H., Schlupp, I., Marsh-Matthews, E. C., Matthews, W. J., Broughton, R. E., and C. W. Lee. 2012. Patterns of change over time in darter (Teleostei: Percidae) assemblages of the Arkansas River basin, northeastern Oklahoma, USA. *Ecography* Available online. DOI: 10.1111/j.1600-0587.2011.06560.x

He, X., Lau, A., Sokhansanj, S., Lim, J., Bi, X., and S. Melin. 2011. Dry matter losses in combination with gaseous emissions during the storage of forest residues. *Fuel* Available online. DOI: 10.1016/j.fuel.2011.12.027

Levis, S., Bonan, G. B., Kluzek, E., Thornton, P. E., Jones, A., Sacks, W. J., and C. J. Kucharik. 2012. Interactive crop management in the Community Earth System Model (CESM1): Seasonal influences on land-atmosphere fluxes. *J. Climate* Available online. DOI: 10.1175/JCLI-D-11-00446.1

Mao, J., Shi, X., Thornton, P. E., Piao, S., and X. Wang. 2012. Causes of spring vegetation growth trends in the Northern mid-high latitudes from 1982 to 2004. *Environ. Res. Lett.* Available online. DOI: 10.1088/1748-9326/7/1/014010

Mosher, J. J., Phelps, T. J., Podar, M., Hurt, R. A., Campbell, J. H., Drake, M. M., Moberly, J. G., Schadt, C. W., Brown, S. D., Hazen, T. C., Arkin, A. P., Palumbo, A. V., Faybishenko, B. A., and D. A. Elias. 2012. Microbial community succession during lactate amendment and electron-acceptor limitation reveals a predominance of metal-reducing *Pelosinus* spp. *Appl. Environ. Microbiol.* Available online. DOI: 10.1128/AEM.07165-11

Mupondwa, E., Li, X., Tabil, L., Phani, A., Sokhansanj, S., Stumborg, M., Gruber, M., and S. Laberge. 2012. Technoeconomic analysis of wheat straw densification in the Canadian Prairie Province of Manitoba. *Bioresource Technol.* Available online. DOI: 10.1016/j.biortech.2012.01.100

Parish, E. S., Hilliard, M., Baskaran, L. M., Dale, V. H., Griffiths, N. A., Mulholland, P. J., Sorokine, A., Downing, M. E., Middleton, R., and N. A. Thomas. 2012. Multimetric spatial optimization of switchgrass plantings across a watershed. *Biofuels Bioprod. Bioref.* Available online. DOI: 10.1002/bbb.342

Parish, E., Kodra, E., Steinhäuser, K., and A. R. Ganguly. 2012. Estimating future global per capita water availability based on changes in climate and population. *Comput. Geosci.* Available online. DOI: 10.1016/j.cageo.2012.01.019

Sangha, A. K., Petridis, L., Smith, J. C., Ziebell, A., and J. M. Parks. 2012. Molecular simulation as a tool for studying lignin. *Environ. Prog. Sustain. Energ.* 31: 47-54.

Syed, M. H., Karpinets, T. V., Parang, M., Leuze, M. R., Park, B. H., Hyatt, D., Brown, S. D., Moulton, S., Galloway, M. D., and E. C. Uberbacher. 2012. BESC knowledgebase public portal. *Bioinformatics* Available online. DOI: 10.1093/bioinformatics/bts016

Takagi, H., Saeki, T., Oda, T., Saito, M., Valsala, V., Belikov, D., Saito, R., Yoshida, Y., Morino, I., Uchino, O., Andres, R. J., Yokota, T., and S. Maksyutov. 2011. On the benefit of GOSAT observations to the estimation of regional CO<sub>2</sub> fluxes. *Scientific Online Letters on the Atmosphere (SOLA)* 7: 161-164.

On January 3<sup>rd</sup> Thomas Thundat, Charles Van Neste, and Arpad Vass were awarded a U.S. Patent (8,089,188) for the new apparatus, Internal Split Field Generator.

Tumuluru, J. S., Sokhansanj, S., Bandyopadhyay, S., and A. S. Bawa. 2012. Changes in moisture, protein, and fat content of fish and rice flour coextrudates during single-screw extrusion cooking. *Food Bioprocess Technol.* Available online. DOI: 10.1007/211947-011-0764-7

Tumuluru, J. S., Sokhansanj, S., Hess, J. R., Wright, C. T., and R. D. Boardman. 2011. A review on biomass torrefaction process and product properties for energy applications. *Industrial Biotechnol.* 7: 384-401

Vishnivetskaya, T. A., Raman, B., Phelps, T. J., Podar, M., and J. G. Elkins. 2012. Chapter 7: Cellulolytic microorganisms from thermal environments. In R. Anitori (Ed.), *Extremophiles: Microbiology and Biotechnology* (pp. 131-158). Norfolk, UK: Caister Academic Press.

Wang, G., Post, W. M., Mayes, M. A., Frerichs, J., and S. Jagadamma. 2012. Parameter estimation for models of ligninolytic and cellulolytic enzyme kinetics. *Soil Biol. Biochem.* 48: 28-38.

Wicklein, H. F., Ollinger, S. V., Martin, M. E., Hollinger, D. Y., Lepine, L. C., Day, M. C., Bartlett, M. K., Richardson, A. D., and R. J. Norby. 2012. Variation in foliar nitrogen and albedo in response to nitrogen fertilization and elevated CO<sub>2</sub>. *Oecologia* Available online. DOI: 10.1007/s00442-012-2263-6

Yazdanpanah, F., Lau, A., Sokhansanj, S., Lim, C. J., Bi, X., and S. Melin. 2012. Resistance of wood pellets to low airflow. *Can. J. Chem. Eng.* Available online.. DOI: 10.1002/cjce.20668

Ye, X., Yuan, S., Guo, H., Chen, F., Tuskan, G. A., and Z. M. Cheng. 2012. Evolution and

divergence in the coding and promoter regions of the *Populus* gene family encoding xyloglucan endotransglycosylase / hydrolases. *Tree Genet. Genomes* 7: 177-194.

### **Notable Achievements**

Jeff Warren was highlighted in the November/December issue of the Climate Change Science Institute (CCSI) Newsletter. Learn more about the CCSI at <http://www.climatechangescience.ornl.gov/>.

Frank Löffler taught the 2011 *Partners in Environmental Technology Technical Symposium & Workshop* Short Course “Thermal Treatment Technologies: Lessons Learned” on December 1<sup>st</sup> in Washington, D.C.



An image associated with the article “Label-free quantitative proteomics for the extremely thermophilic bacterium *Caldicellulosiruptor obsidiansis* reveal distinct abundance patterns upon growth on cellobiose, crystalline cellulose, and switchgrass” appears on the cover of the *Journal of Proteome Research*, Volume 11, Issue 1, released on January 1<sup>st</sup>. Read the original article, appearing in a previous issue of the *Journal* at <http://pubs.acs.org/doi/abs/10.1021/pr200536j>. Coauthors are Adriane Lochner, Richard Giannone, Martin Keller, Garabed Antranikian, David Graham and Robert Hettich. The article was also featured on the Department of Energy (DOE) homepage (<http://science.energy.gov/>).

The Seed Money proposal, “A Fast Neutron Strategy for Creating Deletion Mutant Populations of *Sphagnum* Spp.,” authored by Dave Weston, has been approved for funding.

During January 5<sup>th</sup> and 6<sup>th</sup> Wellington Muchero gave a presentation titled "Partitioning cell wall recalcitrance phenotypes among individual gene effects in *Populus*" at the Bioenergy Science Center (BESC) Characterization Workshop hosted by the National Renewable Energy Laboratory (NREL).

On January 10<sup>th</sup> Mark Peterson gave a presentation to the Environmental Officers Meeting at the Y-12 Complex. The focus of the talk was on the Biological Monitoring and Abatement Program (BMAP) stream research and the value of remediation and pollution prevention activities on stream recovery.

On January 10<sup>th</sup>, 17<sup>th</sup>, 24<sup>th</sup> and 31<sup>st</sup> Keith Kline and Maggie Davis contributed to the planning and implementation of four webinars for the International Organization for Standardization (ISO) Project Committee 248 (Bioenergy Sustainability) Working Group (WG) 4 – Indirect Effects. Efforts focused on completing a final section of the draft report on the state of science of indirect effects related to food security, land-use change, and other sectors. The WG4 report will be shared for review and comment by the broader project committee in February.

Kevin Stewart attended the Deschutes Basin Meeting in Seattle, WA, on January 10<sup>th</sup> -12<sup>th</sup> and presented “Considerations for Incorporating Hydropower Generation.”

On January 11<sup>th</sup> Matt Langholtz and Virginia Dale joined a conference call organized by Ken Skog on a potential workshop regarding fire/ecosystem/carbon biomass. This conference call grew out of discussions at the September 2011 workshop on Sustainability Implications of the Billion Ton Update.

On January 12<sup>th</sup> articles coauthored by Mitch Doktycz and others were highlighted on the website Chemical & Engineering News (<http://cen.acs.org/articles/90/web/2012/01/Coatings-Influence-Nanoparticle-Toxicity.html>). Both the earlier article, “Silver Nanocrystallites: Biofabrication using *Shewanella oneidensis*, and an Evaluation of Their Comparative Toxicity on Gram-negative and Gram-positive Bacteria” (*Environmental Science & Technology*, 44: 520-5215) and the more recent article, “Cytotoxicity Induced by Engineered Silver Nanocrystallites Is Dependent on Surface Coatings and Cell Types” (*Langmuir*, DOI: 10.1021/la2042058) can be read online at <http://pubs.acs.org/doi/abs/10.1021/es903684r> and <http://pubs.acs.org/doi/abs/10.1021/la2042058>, respectively.

Yetta Jager was an invited participant at the Columbia Basin Sturgeon Workshop III in Troutdale, OR, on January 11<sup>th</sup>– 12<sup>th</sup>. Yetta presented “Chutes and Ladders: Modeling Snake River Passage Alternatives” in the Evaluating Passage Risks and Benefits portion of the workshop.

Brennan Smith traveled to Chattanooga, TN, on January 12<sup>th</sup> to meet with the Tennessee Valley Authority (TVA).

Frank Löffler participated in an Advisory Board Meeting for the Sustainable Systems Scientific Focus Area (SFA) at Lawrence Berkeley National Laboratory (LBNL), January 12<sup>th</sup>-13<sup>th</sup> at Hotel Shattuck in Berkeley, CA.

Liyuan Liang served on the Scientific Advisory Board for LBNL's Sustainable Systems SFA, and recently participated in the review of the program at LBNL (January 12<sup>th</sup>-13<sup>th</sup>).

Matt Langholtz is collaborating with Mark Wigmosta and Andre Coleman at Pacific Northwest National Laboratory (PNNL) to include algal feedstocks in a resource assessment.

From January 14<sup>th</sup> to January 18<sup>th</sup> Jerry Tuskan, Wellington Muchero and Jay Chen of the Plant Systems Biology group (in the Biosciences Division [BSD]) attended the International Plant & Animal Genome XX conference at San Diego, CA. Jerry chaired the Forest Tree session 6: Eucalyptus Genome Sequence and Evolution. Wellington presented a poster entitled "Post-GWAS in-silico and molecular validation of genic and Intergenic loci associated with cell-wall recalcitrance in *Populus*." Jay presented a poster entitled "A Functional Genomic Approach for Identifying Regulators of Plant Biomass Recalcitrance in the Woody Bioenergy Crop *Populus*."

Liyuan Liang is serving as a mentor for the mentor-protégé program at Oak Ridge National Laboratory (ORNL) this year, and participated in the first meeting on January 17<sup>th</sup>.

Bob Cottingham along with Rich Stouder from the Global Security Directorate attended the Department of Defense (DOD) Defense Threat Reduction Agency (DTRA) Biosurveillance Ecosystem Focused Innovative Technologies Industry Days held on January 19<sup>th</sup> to hear DTRA Chem-Bio program management present their advance planning regarding technology areas of

interest and an overarching framework to virtualize and integrate biosurveillance detection, investigation and response. This meeting was held at the National Air and Space Museum Steven F. Udvar-Hazy Center near Dulles Airport.

On January 19<sup>th</sup> Rebecca Efroymsen, Debo Olatosu and Virginia Dale joined a conference call with Ranyee Chiang, Kristen Johnson and Alicia Lindauer-Thompson to discuss the workshop on Socioeconomic Indicators planned for April 24<sup>th</sup> in Washington, D.C.

On January 19<sup>th</sup> and 20<sup>th</sup> the ORNL Distributed Active Archive Center (DAAC) co-hosted the visit of Ted Haberman of the National Oceanic and Atmospheric Administration (NOAA) National Geophysical Data Center (NGDC). Discussions focused on metadata and interoperability standards as well as tools to implement those standards.

Brennan Smith, Vince Neary, and Shelaine Hetrick attended the Water Power Program Strategic Priorities Meeting in Boulder, CO, on January 19<sup>th</sup>-20<sup>th</sup>.

Sukanya Iyer, a Genome Science and Technology (GST) grad student with Mitch Doktycz, has received a travel award to the upcoming American Society for Biochemistry and Molecular Biology (ASBMB) meeting (April 21<sup>st</sup>-25<sup>th</sup>, San Diego, CA) for her synthetic biology work. This was a competitive award and required essays and sponsorship.

On January 20<sup>th</sup> Virginia Dale provided comments to the National Research Council on their report “Advancing Strategic Science: A Spatial Data Infrastructure Roadmap for the U.S. Geological Survey” from the National Research Council’s Board on Earth Sciences and Resources.

Jim Elkins met with a group of students from the technology club at Robertsville Middle School in Oak Ridge to help with their project on microbial biofilms. The students are building models depicting biofilm formation and structure for their upcoming Agriculture and Biotechnology competition.

Dale Kaiser attended the 92<sup>nd</sup> Annual Meeting of the American Meteorological Society in New Orleans on January 22<sup>nd</sup>-26<sup>th</sup>. He presented a poster, Spatial and Temporal Analysis and Depiction of Day-of-Year, All-Time Maximum and Minimum Temperature Records Set at USHCN Stations from the early 1900s through 2010, as part of the 24<sup>th</sup> Conference on Climate Variability and Change. The poster gave a preview of a new interface being built on the Carbon Dioxide Information Analysis Center (CDIAC) website that will allow users (with a slant toward non-scientists) to acquire plots and data to better understand how daily record high/low maximum temperatures, and high/low minimum temperatures have changed in their backyards. Learn more at <http://cdiac.ornl.gov/climate/temperature/ustemprecords.html>.

Chris Schadt and Jerry Tuskan participated in a two-day meeting on January 23<sup>rd</sup> and 24<sup>th</sup> at the Joint Genome Institute (JGI) in Walnut Creek, CA, for all 2012 Community Sequencing Program (CSP) projects in the area of Plant Microbe Interactions and Soil Microbial Ecology. Chris presented the ORNL Plant-Microbe Interfaces (PMI) team’s recent work on microbial communities of *Populus deltoides*, and plans for the funded CSP project that will use metagenomic sequencing tools at JGI to examine microbial communities from genetically defined populations of *Populus trichocarpa* in the Pacific Northwest.

Udaya Kalluri is co-Principal Investigator (PI) on a proposal (lead by Venky Pingali and Volker Urban of Neutron Sciences Directorate) that has been accepted by the ORNL Neutron Sciences

User Program, IPTS-4809: "In-situ SANS Structural Studies of Tension Wood Growth."

On January 25<sup>th</sup> ORNL staff including Budhu Bhaduri and Keith Kline discussed ORNL capabilities and opportunities to collaborate on sustainability with Molly Jahn, Special Advisor to the Chancellor & Provost for Sustainability Sciences Laboratory of Genetics at University of Wisconsin's Center for Sustainability and the Global Environment.

On January 25<sup>th</sup> Shahab Sokhansanj met with Hiroshi Morihara President and CEO of HM<sup>3</sup> Energy of Portland Oregon (<http://www.hm3e.com/>). The meeting also included three other HM<sup>3</sup> executives and managers Bill Breneman, Howard Dawson, and David Carter. HM<sup>3</sup> has developed a proprietary process to turn biomass into clean fuel (torrefied biomass or biocoal) to replace coal in coal-fired power plants. The purpose of the visit was to review Shahab's research on densification and torrefaction and seek potential collaborations.

Ruth Duerr of the National Snow and Ice Data Center (NSIDC) and Bob Cook, ORNL DAAC Scientist, were lecturers for a workshop on best practices for data management at the American Meteorological Society 2012 Meeting. The workshop, entitled "Data Management Primer," was organized by the Earth Science Information Partners (ESIP) Federation and sponsored by NOAA, with additional support from the National Science Foundation (NSF) Data Conservancy, the National Aeronautics and Space Administration (NASA), and National Science Foundation (NSF) DataONE. The workshop objective was to provide some best practices for organizing and preparing data for sharing. The lectures are posted at: [http://wiki.esipfed.org/index.php/2012AMS\\_workshop](http://wiki.esipfed.org/index.php/2012AMS_workshop).

Ellen Smith has been appointed to serve as a member of two of the five Working Groups established for the Plan East Tennessee (PlanET) regional initiative: the Working Groups on Transportation & Infrastructure and Environment. PlanET (<http://www.planeasttn.org/>) is a regional partnership of communities that is undertaking a three-year regional planning effort. The five Working Groups consist of individuals with specialized knowledge/interest in particular areas. They will begin their activity in February 2012 and continue through the fall of 2013, holding about 5 meetings during that period.

On January 30<sup>th</sup> Virginia Dale gave a presentation on "The Potential for Sustainable Deployment of Biofuels Under the Energy Independence and Security Act (EISA)" at an American Chemical Society (ACS) Science and the Congress briefing on Cellulosic biofuels on Capitol Hill in Washington, D.C.

On January 30<sup>th</sup> Debo Oladosu collaborated with energy analyst Martin Bo Hansen of Copenhagen-Economics (Denmark), to help with the evaluation of potential availability of biofuel feedstock for meeting European Union (EU) biofuel directives. ORNL provided the data used to generate supply curves and links to the final report, "Biofuel Feedstock Assessment for Selected Countries" (Kline, K. L., Oladosu, G. A., *et al.* 2008. ORNL/TM-2007/224; [http://apps.ornl.gov/~pts/prod/pubs/ldoc10201\\_ornl\\_feedstock\\_potential\\_final\\_feb18.pdf](http://apps.ornl.gov/~pts/prod/pubs/ldoc10201_ornl_feedstock_potential_final_feb18.pdf))

At the 7<sup>th</sup> Annual Chemical, Biological, Radiological, Nuclear, and Enhanced explosive threat (CBRNe) Defense Summit held January 30<sup>th</sup> - February 2<sup>nd</sup> in Alexandria, VA, Bob Cottingham presented on "Computational Methods for Biosurveillance" discussing how computational modeling can be applied to detecting biothreat signature in noisy data.

During January 30<sup>th</sup>-February 10<sup>th</sup> Kathy Gant was in Vienna, Austria, working for the International Atomic Energy Agency. She is preparing a response guidance document on using

operational intervention levels to allow quick protection of the public in a nuclear power plant or spent fuel storage accident.

ORNL DAAC staff (Chris Lenhardt, Yaxing Wei, Ranjeet Devarakonda, and Bob Cook) participated in the Science Advisory Board (SAB) Meeting for the ORNL's Climate Change Science Institute on January 31<sup>st</sup>. The CCSI is the ORNL DAAC's home institution, and the SAB provides strategic advise about current activities and future plans.

### **BESD New Arrivals**

Michael Bellamy arrived in January to work as a postdoctoral research associate with Keith Eckerman.

Sonya Clarkson arrived in January to work as a postdoctoral research associate with Jim Elkins. Sonya will work on engineering *E. coli* for lignin bioconversion and look at pretreatment inhibitor tolerance in thermophilic anaerobes.

Erik Green arrived in January to work as a post-Masters research associate with Bob Cook. Erik will primarily curate and archive earth science data.

Albert Ryou joined the Energy Water Ecosystem Engineering Group as a student intern through the DOE Science Undergraduate Laboratory Internship (SULI). Albert will work directly with Vincent Neary to assist in reviewing literature and developing a summary table on mean flow and turbulence characteristics of wind flows in atmospheric boundary layers and water flows in rivers. Albert will also assist in developing protocols for signal processing of raw acoustic Doppler velocimeter (ADV) and acoustic Doppler current profiler (ADCP) time series data.