

BESD Newsletter November 2010

Pubs and Products

Bitra, V. S. P., Womac, A. R., Igathinathane, C., and S. Sokhansanj. 2010. Knife mill comminution energy analysis of switchgrass, wheat straw, and corn stover and characterization of particle size distribution. *Transactions of the ASABE*. 53:1639-1651.

Bruins, R., Hoekman, S. K., Efroymson, R., Aden, A., and A. Hecht. 2010. Transportation fuels for the 21st Century. *EM Magazine* November 2010: 26-32.

Gao, H., Wang, X., Yang, Z. K., Chen, J., Liang, Y., Chen, H., Palzkill, T., and J. Zhou. 2010. Physiological roles of ArcA, Crp, and EtrA and their interactive control on aerobic and anaerobic respiration in *Shewanella oneidensis*. *PLOS One* Accepted.

Gu, L., Pallardy, S. G., Tu, K., Law, B. E., and S. D. Wullschleger. 2010. Reliable estimation of biochemical parameters from C3 leaf photosynthesis–intercellular carbon dioxide response curves. *Plant Cell Environ.* 33:1852-1874.

Hatab, N. A., Eres, G., Hatzinger, P. B., and B. Gu. 2010. Detection and analysis of cyclotrimethylene-trinitramine (RDX) in environmental samples by surface enhanced Raman spectroscopy. *J. Raman Spectr.* 41: 1131-1136.

Mobini, M., Sowlati, T., and S. Sokhansanj. 2010. Forest biomass supply logistics for a power plant using the discrete-event simulation approach. *Appl. Energ.* Accepted.
DOI:10.1016/j.apenergy.2010.10.016

Sokhansanj, S., Mani, S., Igathinathane, C., and S. Tagore. 2010. Heat and power production from stover for corn ethanol plants. In P.N. Mascia *et al.* (Eds.) *Plant Biotechnology for Sustainable Production of Energy and Co-products, Series: Biotechnology in Agriculture and Forestry, Vol. 66* (pp. 345-362). Berlin: Springer – Verlag.

Notable Achievements

"Why Plants Don't Want to be Turned into Gasoline" was the subject of a radio broadcast on WREK Atlanta, during the "Inside the Black Box – Science, Only Funnier" program on Wednesday, August 25th, by Jeremy Smith of the Center for Molecular Biophysics at Oak Ridge National Laboratory (ORNL). Jeremy discussed what we could do with supercomputers and neutrons to help quietly persuade these plants to cooperate. <http://www.wrek.org/blackboxshows>
Listen to an audio recording of the show by following the links for August 25th beginning at <http://www.wrek.org/blackboxarchive>.

Carrie Miller attended the International Workshop on Mercury in Contaminated Sites: Characterization, Impacts and Remediation held in Piran, Slovenia, sponsored by the Jozef Stefan Institute in Slovenia, the National Institute for Minamata Disease in Japan and the National Institute of Biology in Slovenia. As an invited participant in this workshop, Carrie presented ORNL research examining treatment methods for reducing mercury in contaminated streams.

During the last week of October (22nd-29th), Madhavi Martin was a member of a technical delegation to India representing ORNL. The delegation met with scientists from the Ministry of Renewable Energy (MNRE), the Ministry of Science - Department of Biotechnology, and several representatives of Indian research institutions. During this trip she participated in a workshop being organized by the Confederation of Indian Industry (CII), "Biofuels India 2010: Sustainable Biofuels Market & Technology Development," held in New Delhi on Thursday, October 28th. This is an independent, topical side meeting to the Delhi International Renewable Energy Conference (DIREC 2010), which was held that same week.

1. The official Mission purpose was:
 - a. Honor U.S. commitments to collaborate under the Department of Energy (DOE) - MNRE Biofuels Memorandum of Understanding and India-U.S. Energy Dialogue (New Technologies and Renewable Energy Technical Working Group)
 - b. Learn about biofuels work currently being done in India and identify common R&D priorities and mutually beneficial opportunities for possible future collaboration and exchange
 - c. Perform and monitor work being conducted through our existing DOE biofuels collaborations.

On October 27th-28th Annetta Watson (Environmental Sciences Division [ESD]), Robert Bock (ESD) and Cyril Thompson (Chemical Sciences Division [CSD]), Team members on the multi-lab Facility Restoration Operational Technology Demonstration Project supported by the U.S. Department of Homeland Security, gave poster and panel presentations as well as demonstrations at the "East Coast Airport Chemical Warfare Agent/Toxic Industrial Compound Remediation Workshop and Demonstration" held at the Dulles Airport Hilton. This ORNL team presented 4 posters several times a day as well as individual panel presentations on "Characterization Sampling and Analysis Methods," "Decontamination" and "Clearance Guidelines." The ORNL Team also helped manage chemical warfare agent tabletop exercises specific to La Guardia, Boston Logan and Dulles airports. A high point of the Workshop was the introduction and distribution of the Project's training DVD "Remediation Guidance for Major Airports After a Chemical Attack: Pre-planning, Issues and Tools;" the script for this training tool was co-authored by John Sorensen, Barbara Sorensen, Annetta Watson, Cyril Thompson and Robert Bock of ORNL with their colleagues Rita Betty of Sandia National Lab (SNL) and Don MacQueen of Lawrence Livermore National Lab. SNL was the lead lab on the DVD effort, and Ms. Betty was the Training DVD Team Leader. The DVD was well received by police, fire and security agencies present, as well as the various Port and airport authorities.

Tammy Beaty, ORNL Distributed Active Archive Center (DAAC) User Operations Manager, attended the Geological Society of America (GSA) Meeting, October 31st through November 3rd in Denver. She also provided support for the OneNASA booth while at GSA.

October 31st-November 3rd: Mark Downing and Michael Casler (Agricultural Research Service [ARS] Research Geneticist, Madison, Wisconsin) organized a symposium, "Biomass Energy Systems: Research Needs to Address Policy Issues," at the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America (ASA-ASSA-CSSA) Joint Convention in Long Beach, CA. <https://www.acsmmeetings.org/> Presentations Included:

- *Are Our Research Needs Driving Policy? or Is Policy Driving Our Research?* given by Mark Downing.
- *Bioenergy Research and Strategic Planning: The Need for Both Proactive and Reactive Research* given by Robert Mitchell, United States Department of Agriculture (USDA) -ARS; Kenneth Vogel, USDA-ARS.

- *The Tyranny of Big Ideas in Environmental Policy* given by Alan Lucier, National Council for Air and Stream Improvement (NCASI).
- *TNC Perspective* given by Jimmie Powell, The Nature Conservancy (TNC).

Robin Graham and Katherine Ragle attended the Southeast Biomass Conference held in Atlanta, GA, November 2nd-4th. The meeting was a combination research and trade show. ORNL's bioenergy booth was displayed there. The meeting was attended by ~ 400 and focused on Southeastern bioenergy issues. Of particular interest was the strong emphasis both on biopower and wood pellet production for Europe.

Bruce Wilson, Bob Cook, and Giri Palanisamy attended the DataONE all-hands meeting in Albuquerque, NM, on November 2nd- 4th. Also attending was Rama Ramapriyan from the Earth Science Data and Information System (ESDIS).

Allison Fortner was featured in the November Sustainable Campus Newsletter for her handmade soy candles and bath items made with natural ingredients that she displayed at the ORNL Fall Festival on November 3rd. View the Sustainable Campus Newsletters on ORNL's Sustainable Campus Initiative's website: <http://sustainability-ornl.org/Pages/newsletters.aspx>.

Jay Chen was selected and served as a grant panelist for the Plant Sciences Program of the USDA National Institute of Food and Agriculture from November 3rd to November 5th in Washington D.C.

On November 4th Debo Oladosu attended the National Corn Growers Association (NCGA) Ag Energy Symposium in Washington, D.C. and presented "Empirical Analysis of the Sources of Corn Used for Ethanol Production in the United States: 2001-2009."

On November 4th Shahab Sokhansanj attended a webinar organized by the Biomass Thermal Energy Council (BTEC). The presentation title was "Green Heat for Homes: Benefits and Challenges of Residential Biomass Energy." This was the second webinar of a series introducing biomass as a viable option for bioenergy in different sectors. The first webinar was delivered September 28th and concerned the opportunity of biomass energy: renewable, heating and combined heat and power (CHP). These webinars are funded through a grant from the United States Department of Agriculture - Forest Services to BTEC.

Vince Neary and Mark Bevelhimer visited the Ocean Renewable Power Company's (ORPC) test site in Eastport Bay, Maine, in November to witness acoustic fish monitoring at the only operating tidal energy test device in the U.S. They met with ORPC and University of Maine researchers to discuss future collaborative opportunities with ORNL's Waterpower Program. It just happens that this test site can be seen from the family summer cottage of ESD's Paul Leiby.

On Saturday, November 6th, Esther Parish provided a requested "BIG picture of climate change" talk at the Great Smoky Mountains Institute at Tremont's workshop for educators entitled, "Salamanders and Storms: Climate Change in the Smokies." There were about 20 folks from across the eastern U.S. in attendance, including high school and middle school science teachers, park rangers, volunteers from the Student Conservation Association (SCA), and an inspector from the Kentucky Division of Air Quality. The North Carolina Department of Transportation has provided funding for these climate workshops to be held at Tremont through 2015.

A group from ESD attended the Society for Environmental Toxicology and Chemistry North America 31st Annual Meeting, November 7th-11th, in Portland, Oregon. Mark Greeley and Marshall Adams both gave platform presentations, and Marshall Adams, John Smith, and Allison Fortner gave poster presentations in a session titled “TVA Kingston Fly Ash Release: A Case Study in Environmental Investigations of Coal Ash Toxicity.” Teresa Mathews gave a platform presentation about wildlife exposure to mercury in East Fork Poplar Creek. Mark Peterson and Teresa Mathews both gave poster presentations relating to coal ash ecotoxicology research on the Oak Ridge Reservation. Please see the title specifics below:

Platform presentations:

S. M. Adams, M. S. Greeley, and S. Teh. An integrated health assessment of fish populations exposed to fly ash releases at the TVA Kingston facility.

M. Greeley and S. M. Adams. Evaluation of the risks to fish reproduction from the TVA Kingston Steam Plant coal ash spill.

T. Mathews, M. Peterson, G. Southworth, J. G. Smith, K. Roy, N. Giffen. Evaluating wildlife exposure to stream and floodplain mercury: A review of East Fork Poplar Creek studies.

Poster presentations:

A. M. Fortner, S. M. Adams, T. Baker. Assessment of bioaccumulation of fly ash-associated metals by fish in the area of the TVA Kingston fly ash release.

S. M. Adams, G. Southworth, M. Peterson, T. J. Mathews, D. H. Ketelle. Fly ash and mercury: does selenium in fly ash inhibit methylmercury bioaccumulation?

J. G. Smith, T. Baker. Accumulation of contaminants by aquatic invertebrates downstream of a fly ash spill at the Tennessee Valley Authority Kingston Fossil Plant

T. J. Mathews, G. Southworth, M. Peterson, S. M. Adams, M. Greeley, L. Lubeley. Hg/Se interactions and fly ash: lessons learned from field and laboratory studies.

M. Peterson, J. G. Smith, M. Ryon, T. Mathews, G. Southworth. Long-term biological monitoring of a stream system that received coal ash discharges.

Amy Wolfe and David Bjornstad were invited to participate in a workshop on “Issues arising from Synthetic Biology: What Lies Ahead?” sponsored by the U.S. Department of Energy Office of Biological and Environmental Research, together with the Alfred P. Sloan Foundation and the Woodrow Wilson International Center for Scholars. The workshop was held on November 8th and 9th at the Woodrow Wilson Center in Washington, D.C. Wolfe, Bjornstad, and other participants explored the range of ethical, social, and legal issues that may arise from research on synthetic biology.

Shahab Sokhansanj travelled to Seattle, Washington, to participate in the Washington Bioenergy Research Symposium and the Washington Future Energy Conference (November 8th-10th). He presented the poster “Biomass pelletization and logistics.” It described three main projects: pellets made from steam-exploded biomass, pellets made from torrefied biomass, and logistics modeling (IBSAL).

Tatiana Vishnivetskaya attended the MicroPerm Workshop in Potsdam, Germany, November 8th-10th. There she gave the plenary talk, "Microbial communities in deep permafrost biosphere" and also chaired the working group, “Are there permafrost specific microbial communities?”

Biogeography, diversity and key players of permafrost microbial communities.” About twenty scientists took part in the discussion and made suggestions on the development of a cryo-microbial database for strains and sequences. Information about permafrost microbiology research is to be included in this database, and links to other databases will be provided to easily find, download and compare sequences and metagenomes derived from different cold regions.

Rebecca Efrogmson and Lenny Bernstein, a consultant retiree with long-term experience in the petroleum industry and lead author of Intergovernmental Panel on Climate Change (IPCC) assessment reports, met with Charles Bancroft and Bud Moore from Sunburst Systems (<http://www.sunburstsyste.ms.net>) of Asheville, NC. The meeting, convened by the Blue Ridge Sustainability Institute, concerned design, system process efficiency and carbon balance of an innovative system to reclaim landfill gas to produce biodiesel and ethanol from algae. As a byproduct of the system, electricity will be produced and used for internal use and the rest sold back to the electrical grid.

The Lorraine region of France presented Jessy Labbé the award of Excellent Scientific Work for his research in the article “Identification of quantitative trait loci affecting ectomycorrhizal symbiosis in an interspecific F1 poplar cross and differential expression of genes in ectomycorrhizas of the two parents: *Populus deltoides* and *Populus trichocarpa*,” in press in the journal *Tree Genetics and Genomes*. He was also awarded the 2010 Young Researcher Award. Jesse is a postdoctoral fellow in the Biosciences Division and contributes to the Plant Microbe Interfaces Science Focus Area, funded by DOE- Biological and Environmental Research (BER). His efforts are integral to collaborations with researchers at the National Institute for Agricultural Research (INRA), Nancy, France. The award ceremony took place in France on December the 2nd.

ESD’s Esther Parish received a recent "Computing & Computational Sciences" Significant Event Award (SEA) along with colleagues in two other divisions (Computational Sciences and Engineering & Computer Science and Mathematics) for "Novel analyses of the simulation results from the CCSM (Community Climate System Model) 3.0 climate model." Others recognized for this award were: Auroop Ganguly, Nagendra Singh, David J Erickson III, Karsten Steinhaeuser, Marcia Branstetter, Lawrence Buja, and John Drake.

In an effort to confirm the accuracy of ORNL’s metadata for the flux towers, the FLUXNET staff at the ORNL DAAC have contacted the Principal Investigators of all FLUXNET sites except for those in Ameriflux. Each principal investigator was sent a custom-generated email with links to the relevant FLUXNET web pages and asked to respond with proposed changes. Of the 196 emails sent, 46 responses with suggested changes have been received. The updates are being compiled into a single document, and modifications made in the database after coordination with some of the other regional FLUXNET networks, such as CarboEuropeIP. The current effort is being evaluated to determine whether this should become an annual process.

On November 12th-13th Carolyn Hoagland presented a poster, “Do Cellulosic Ethanol Incentives Threaten Food Producing Acres?” at the Sigma Xi annual conference in Raleigh, NC.

ORNL participated in at least four full proposals in response to the 2010 DOE-USDA Biomass Research Initiative call for proposals to create consortia to simultaneously address a feedstock, conversion, and analysis combination. ORNL participated in proposals led by Ceres, Inc., Louisiana Green Fuels Group, Exelus, Inc, and University of Kentucky. About 60 preproposals were submitted; thirty were asked for a full proposal; about 5-6 awards are expected. Due to USDA overhead restrictions, ORNL involvement is heavily weighted towards student efforts.

Significant Event Awards (SEAs) have been awarded in Biological and Environmental Sciences to

- Mitchel Doktycz, Xiaohan Yang, Gerald Tuskan, Tatiana Karpinets, Christopher Shadt, Guruprasad Kora, Edward Uberbacher, Andrey Gorin, Timothy Tschaplinski, Jennifer Morrell-Falvey, Dale Pelletier, Scott Retterer, Gregory Hurst, Carmen Foster, Udaya Kalluri, Catherine Gaudreau and David Weston for successfully ensuring future funding for the Plant-Microbe Interfaces Science Focus Area.
- Paul Hanson, Chris Tavino, Don Todd, Jeff Riggs, Warren Thomas, Buddy Johnson, Eriks Jekabsons, Kenneth Childs, Damen Belcher, Charlotte Barbier and Greg Newkirk for successful design, development and initiation of the prototype-warming chamber for the Spruce and Peatland Response Under Climatic and Environmental change experiment (SPRUCE).

On November 15th Dali Wang gave a presentation entitled "A CCSM (Community Climate System Model)-based Terrestrial Ecosystem Model Parameterization Framework" at the Supercomputing Conference 2010 in New Orleans, LA.

John Sorensen was appointed to the Expert Advisory Panel on the Rad Resilient Cities Program at the Center for Biosecurity of the University of Pittsburgh Medical Center (UPMC).

November 16th-18th Bob Perlack was an invited speaker at the Renewable Energy Biomass Field Days held in Knoxville, TN. Bob presented "Biomass Production – Agricultural perspective," an overview of the billion-ton resource assessment emphasizing agricultural biomass feedstocks, namely primary crop residues and energy crops.

ORNL DAAC Deputy Manager, Chris Lenhardt, participated in a telecon of the Earth Science Information Partners (ESIP) Federation Executive Committee on November 16th.

Robin Graham hosted Valri Lightner and Raynee Chiang of the DOE Biomass Program on November 18th. Valri and Raynee visited with Budhu Bhaduri and other working on the bioenergy Knowledge Discovery Framework (KDF) and visited the Everest room. They also met with Virginia Dale on sustainability, Yetta Jager on water quality modeling, and Laurence Eaton on the Billion Ton Update. Valri met with Brian West and Tim Theiss on Intermediate Blends work while Raynee attended the CBES seminar. Both Valri and Raynee met with Brian Davison and Steve Brown on BESC activities.

Katherine Heal, an intern with Melanie Mayes through the Oak Ridge Science Semester (ORSS) program, has won second place in the environmental science category of the DOE Office of Science (SC) Energy Research Challenge for November. In her research Katherine was attempting to quantify the effectiveness of deep soils for uptake of infiltrating dissolved organic carbon. She completed dissolved carbon sorption experiments on hundreds of samples statistically selected to represent most soils in the eastern U.S. She found that for each of the three major soil orders, different characteristics of the soils (e.g., iron content, organic carbon content, or pH) were responsible for the uptake of dissolved organic carbon. Because soil orders develop in response to geology, vegetation, and climate, her results suggest a regional signature to the mechanisms of dissolved carbon stabilization in subsoils. These findings are applicable to improved regional modeling of the stabilization of organic carbon in soils and in evaluation of climate mitigation strategies. This work is now under peer review in an international journal. Katherine is currently aboard an oceanic research vessel and is applying to graduate programs to pursue a degree in chemical oceanography.

On November 18th Keith Kline gave a presentation on bioenergy, land-use and the Global Sustainable Bioenergy initiative at the monthly American Institute of Chemical Engineers (AIChE) meeting in Knoxville, TN.

Mark Bevelhimer was recently an invited panelist at a regional meeting of the National Hydropower Association in New Hampshire and spoke on environmental mitigation associated with conversion from peaking to run-of-river operations at hydropower dams.

On November 20th Virginia Dale was part of a panel on career opportunities at the “Undergraduate Research Conference at the Interface of Biology and Mathematics” conducted by the National Institute for Mathematical and Biological Synthesis (NIMBioS) in Knoxville, TN (http://www.nimbios.org/education/undergrad_conf2010). Several of the students were interested in careers involving agriculture and sustainability.

Robin Graham hosted a visit by Dave Muth from Idaho National Laboratory (INL) on Nov 23rd. Dave visited to learn about ORNL transportation data and modeling capabilities and to discuss a new approach for calculating the biorefinery throat cost of biomass. Dave met with Budhu Bhaduri, Rahul Ramachandran, Mike Hilliard, Nagendra Singh, Erin Webb, Craig Brandt, Mark Downing, and Matt Langholtz.

Bob Cook attended the National Climate Assessment Workshop "Ecosystem structure, function, and biodiversity in relation to changes in climate," November 30th through December 1st in Washington, D.C.

BESD New Arrivals

Adam Guss reported to work in November, working as a Genetic and Metabolic Engineer with David Graham in the Biosciences Division's (BSD) Microbial Ecology and Physiology Group.

Kathy Huczko reported to work in November, working as a Technical Project Leader with Stan Wullschlegel in ESD's Ecosystem Science and Climate Ecosystem Dynamics Groups.

Shih-Chieh Kao reported to work in November, working as a Water Resources Engineer and Statistical Hydrologist with Brennan Smith in ESD's Energy-Water-Ecosystem Engineering Group.

David Kocman joined ESD on November 29th, working as a postdoctoral research associate with Scott Brooks on the Mercury Science Focus Area (SFA). David earned his Ph.D. from the Jožef Stefan International Postgraduate School, Ecotechnology Programme, Ljubljana, Slovenia. For his dissertation David studied mass flows of mercury in the Idrijca catchment area, Slovenia, which is heavily impacted by former mercury mining. By measuring mercury and its species/forms in soils, sediments, water and air, recent sources and levels of mercury were established. These data were then used for development and calibration of a catchment scale mercury mass-balance model within the GIS.

Loukas Petridis reported to work in November, working as a Computational Molecular Biophysicist with Bob Cottingham in BSD's Computational Biology and Bioinformatics Group.

Guoping Tang reported to work in November, working as a Subsurface Processes Modeler with Scott Brooks in ESD's Earth and Aquatic Sciences Group.

HR Information Flash

Electronic W-2s available to UT-Battelle employees

UT-Battelle (UTB) employees may now choose to receive their W-2s online through Employee Self-Service (ESS).

Electronic W-2 forms for the 2010 tax year will be available online to active UTB employees who sign up (i.e., consent) to receive them electronically instead of receiving a paper copy by U.S. Mail. Employees electing the electronic version will have access to their W-2s using ESS before the paper copy is available. In addition, the electronic version of the W-2 forms will remain on the ESS site until October 17th, 2011.

To access W-2s online in January 2011, employees must, according to Internal Revenue Service (IRS) regulations, give UTB their consent. Enrollment for giving UTB consent begins Monday, December 6th, 2010, and closes January 14th, 2011. Please note If you have previously consented either online or as part of the hiring process, you are not required to consent again to receive your 2010 W-2 electronically.

To provide consent, access ESS from the Inside ORNL homepage no later than January 14th, 2011. The link to ESS (<https://portal.ornl.gov/sites/bisd/apps/ess.aspx>) is located under Staff Services. Click on "Consent to Receive Electronic W-2" under the "Year End 2010 Payroll Tax Reporting" section under My HR. After logging on, employees can view the consent agreement and select option 1 ("I Agree") to give UTB consent.

Employees will be notified via e-mail and "Inside ORNL" as soon as W-2s are available to access online.

Those employees who do not consent to access their W-2 online can do so by clicking option 2 (Exit). Employees who select neither option will continue to receive their W-2 through the U.S. mail, postmarked no later than January 31st, 2011. A W-2 will be mailed only to those who did not consent to receive it online.

Changed address? Employees whose name or permanent mailing address changed in 2010 must update their personnel records by close of business **January 7th, 2011**, to ensure their W-2s are mailed to the correct address. Those who have questions may contact Payroll Services at Payroll@ornl.gov.

Quality Counts *(a message from your BESD Quality Manager, Karen Sabo, 1505/252, 574-4398)*

It's time to take a Quality Quiz . . . Which of the following activities falls under the ORNL "Quality Counts in Everything We Do" program?

1. Reporting research highlights
2. Maintaining a questioning attitude
3. Organizing work areas to get rid of unneeded items
4. Periodically checking the Publication Tracking System (PTS) for updates and accuracy
5. Participating in RSS reviews that cover your work area and activities

If you answered "all of the above," recognize and give yourself credit for the quality job you do every day and keep up the good work.