

B&ESD Newsletter November 2012

Pubs and Products

Dale, V. H., Efroymson, R. A., Kline, K. L., Langholtz, M. H., Leiby, P. N., Oladosu, G. A., Davis, M. R., Downing, M. E., and M. R. Hilliard. 2012. Indicators for assessing socioeconomic sustainability of bioenergy systems: A short list of practical measures. *Ecol. Indic.* Available online. DOI: 10.1016/j.ecolind.2012.10.014

Dale, V. H., Kline, K. L., Kaffka, S. R., and J. W. A. Langeveld. 2012. A landscape perspective on sustainability of agricultural systems. *Landscape Ecol.* Available online. DOI: 10.1007/s10980-012-9814-4

Efroymson, R. A., Day, R. J., and M. D. Strickland. 2012. A retrospective tiered environmental assessment of the Mount Storm Wind Energy Facility, West Virginia, USA. ORNL/TM-2012/515. Oak Ridge National Laboratory, Oak Ridge, TN.

H.-B. Guo, F. He, B. Gu, L. Liang, J. C. Smith. 2012. Time-dependent density functional theory assessment of UV absorption of benzoic acid derivatives. *J. Phys. Chem. A.* Available online. DOI: 10.1021/jp3084293

Jagadamma, S., Mayes, M. A., and J. R. Phillips. 2012. Selective sorption of dissolved organic carbon compounds by temperate soils. *PLoS ONE* 7: e50434.

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Rao, B., Wang, W., Qingsong, C., Anderson, T. A., and B. Gu. 2012. Photochemical transformation of the insensitive munitions compound 2,4-Dinitroanisole. *Sci. Total Environ.* Available online. DOI: 10.1016/j.scitotenv.2012.11.033

Riccardi, D., Guo, H.-B., Parks, J. M., Gu, B., Liang, L., and J. C. Smith. 2012. Cluster-continuum calculations of hydration free energies of anions and group 12 divalent cations. *J. Chem. Theor. Comp.* Available online. DOI: 10.1021/ct300296k

Yee, K. L., Rodriguez, M, Jr., Tschaplinski, T. J., Engle, N. L., Martin, M. Z., Fu, C., Wang, Z.-Y., Hamilton-Brehm, S., and J. R. Mielenz. 2012. Evaluation of the bioconversion of genetically modified switchgrass using simultaneous saccharification and fermentation and a consolidated bioprocessing approach. *Biotechnol. Biofuel.* 5: 81.

Notable Achievements

In October 2012, the American Association for Advancement of Science (AAAS) Council elected 701 members as Fellows of AAAS. These individuals will be recognized for their contributions to science and technology at the Fellows Forum to be held on 16 February 16th, 2013, during the AAAS Annual Meeting in Boston, Massachusetts. The new Fellows will receive a certificate and a blue and gold rosette as a symbol of their distinguished accomplishments. Gary Saylor, Director of the Joint Institute for Biological Sciences (JIBS), is included in these new Fellows.

On November 1st Keith Kline, Maggie Davis, and Shujiang Kang met with Lee Lynd (Dartmouth) to discuss collaborations with Brazil and the Global Sustainable Bioenergy project on consistent and comparable environmental and socio-economic indicators and ways to address food security.

The Oak Ridge National Laboratory (ORNL) Carbon Dioxide Information Analysis Center (CDIAC) has released DayRec: An Interface for Exploring United States Record-Maximum/Minimum Daily Temperatures. Developed by Dale Kaiser, the interface uses a select subset of daily Tmax and Tmin data from the National Oceanic and Atmospheric Administration (NOAA) Global Historical Climatology Network (GHCN)-Daily database to examine record-setting U.S. temperatures over 1911-2010. Learn more about DayRec online at http://cdiac.ornl.gov/climate/temp/us_recordtemps/dayrec.html.

In November the Center for BioEnergy Sustainability (CBES) monthly reports and presentations generated interest in recent publications. Papers on socio-economic indicators, context for indicator selection and interpretation, scales of environmental effects for ethanol and gasoline pathways, and "A landscape perspective on sustainability of agricultural systems" were among those requested and shared with interested parties including the Roundtable for Sustainable Biofuels (RSB in Switzerland), Porter Center-Imperial College of London, Be-Basic (Netherlands), the ISO PC-248 international work group on indirect effects, and the Center for Bio-Ethanol Research and Technology (CTBE) in Brazil.

On November 2nd the article "Three UT Professors Combine ORNL Neutrons with UT Knoxville Superconducting Magnet and Supercomputing to Probe Enzyme Function" (<http://www.nics.tennessee.edu/superconducting-magnet-and-supercomputing>) was posted on the University of Tennessee website for the National Institute for Computational Sciences (NICS). It highlights work by Jeremy Smith and others, using computer simulations to better understand cytochrome p450.

During November 2nd-30th Keith Kline and Maggie Davis provided draft text and participated in multiple calls to develop a US position statement and consolidated comments on International Organization for Standardization (ISO) Committee Draft 13065, Sustainability Criteria for Bioenergy. Progress update #8 on Office of the Biomass Program (OBP) contributions to the ISO process was distributed on November 8th.

ORNL staff had an ORNL communications feature article published for their work on the Carbon Partitioning in Trees and Soils (PITS) project. This is a paired experimental and modeling effort

focused on improving representation of mechanistic ecosystem processes in earth system models, especially CLM4. Participants include Jeff Warren, Colleen Iversen, Rich Norby, Joanne Childs, Jiafu Mao, Dan Ricciuto, Deanne Brice, Jonathan Brooks, Kelsey Carter, Peter Thornton and Jessica Bryant (UT). Read the feature article online at http://www.ornl.gov/info/features/get_feature.cfm?FeatureNumber=f20121031-00.

The ORNL Distributed Active Archive Center (DAAC) Leadership Team, Chris Lenhardt, Tammy Beaty, Bob Cook, Suresh K.SanthanaVannan, and Ben McMurry, participated in the user working group (UWG) Teleconference on November 5th. During this teleconference, the UWG approved the ORNL DAAC's FY 2013 Work Plan as presented and discussed.

On November 5th ORNL staff including Mark Downing, Erin Webb, Laurence Eaton, and Craig Brandt, met with Ron Zalesny (United States Department of Agriculture [USDA] Forest Service), William Headlee (Iowa State), Glen Stanosz (University of Wisconsin), Tim Rials (University of Tennessee, Knoxville [UTK]) and Gary Kling (University of Illinois, Urbana-Champaign) to discuss poplar productivity modeling. Zalesny and Headlee have adapted the 3PG model to predict mature hybrid poplar woody energy crop yields for Minnesota and Wisconsin. The meeting explored the potential to collaborate to expand the spatial range to those areas where hybrid poplar has a comparative advantage over other potential woody crop species within the lower 48 states, and to refine productivity and supply potential projections established in the Billion Ton Update.

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

During November 5th-9th Glenn Cada gave an invited keynote address at II Sympass – The Second International Symposium on Fish Passages in South America, in Toledo, Parana State, Brazil. The title of his presentation was “A Traits-Based Assessment Approach for Estimating Downstream Fish Passage Impacts of Hydropower Projects.”

During November 5th-8th the 9th Biennial Short Rotation Woody Crops Operations Working Group met in Oak Ridge, Tennessee. Several presentations were made by ORNL staff:

- Opening Remarks - Mark Downing
- New Technology for New Markets - Jerry Tuskan
- Harvest Scheduling of Eucalyptus spp. in Florida for Economic and Environmental Optimization - Matt Langholtz
- Evaluating the Impact of Feedstock Quality on Delivered Cost: Two Case Studies from the US Southeast Region - Laurence Eaton
- Environmental and Socioeconomic Indicators for Bioenergy Sustainability as Applied to Short Rotation Woody Crops - Virginia Dale
- Handling/preparation of biomass wood chips (ORNL Gasification Unit) - Chris Keziah
- Wrap Up with Conference Summary and Challenges - Mark Downing with Tim Rials of The University of Tennessee

Read more at <http://www.woodycrops.org/News/2012+SRWCOWG+Conference.htm>.

On November 6th ORNL CBES members (Paul Leiby, Keith Kline, Rebecca Efrogmson, and Virginia Dale) provided comments and revisions for the draft OBP “Social Aspects of Bioenergy Sustainability Workshop Report.”

Also on November 6th Keith Kline and Maggie Davis participated in a planning call for implementation of the “Sustainability, Ecosystem Services, and Bioenergy Development across the Americas” project under a National Science Foundation (NSF) Partnership for International Research and Education (PIRE) grant.

ORNL DAAC Manager, Chris Lenhardt, attended the NOAA Data Archiving and Access Requirements Working Group (DAARWG) Meeting, November 6th-9th, in Silver Springs, MD. He has also been selected to be the incoming Chair of DAARWG starting January 2013.

Boualem Hadjerioua went to Vanderbilt University (Nashville, TN) on November 7th to discuss the Cumberland Water Quality Modeling project.

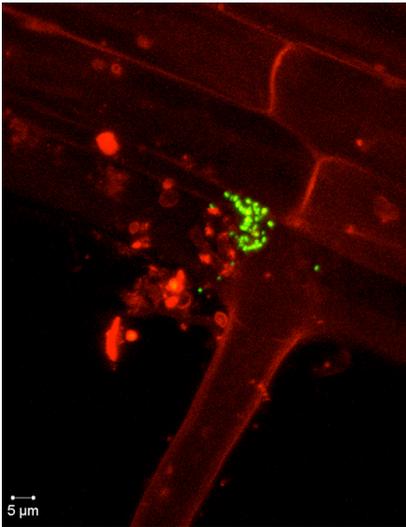
On November 8th Shih-Chieh Kao attended the National Hydropower Asset Assessment Program – New Stream Reach Development (NHAAP-NSD) Status Meeting (ORNL) with a focus on program development.

Carmen Foster traveled to the University of the Cumberlands in Williamsburg, KY, on November 8th to teach a 3-hour class on mouse dissection and lymphoid organ function for Lisa Lyford's senior biology class. Many of the 8-student class aim to pursue a career in medicine.

Jeremy Smith was recently interviewed by ORNL about his work and research. Read the interview, titled “Joining forces for biofuels: Computing and neutron science overcome bioenergy roadblocks” at http://www.ornl.gov/info/ornlreview/v45_3_12/article06.shtml.

Bob Cottingham attended the 2012 Supercomputing (SC12) conference in Salt Lake City, UT, during November 10th-14th.

Jennifer Morrell-Falvey submitted an image of green fluorescent protein (GFP)-expressing *Pantoea* (PMI strain YR343) on a plant root. It has been selected for the cover of the January 2013 issue of the journal *BioScience*. The *Pantoea* strain was engineered by Amber Bible, a post-doctoral fellow in Jennifer's lab. A strain of engineered plant-associated *Pantoea*—a Gram-negative bacterium—fluoresces green under laser light against a background of red autofluorescence from a wheat plant in this live confocal microscope image. The *Pantoea* strain forms a mutualistic interaction with its host plant and appears to promote its growth. The green fluorescent protein is produced when a gene encoding the enzyme diguanylate cyclase, an enzyme important in plant colonization, is activated. Systems similar to this have been entered in the international Genetically Engineered Machines (iGEM) student competition, which encourages participation in the burgeoning field of synthetic biology.



Beth Hawkins and Erin Rose attended the Behavior Energy and Climate (BECC) Conference in Sacramento, CA, during November 11th-14th.

Mark Bevelhimer attended a workshop on electromagnetic field (EMF) effects in Monterey, CA, during November 11th – 16th.

Latha Baskaran presented “Modeling the effects of switchgrass management on aquatic macroinvertebrates” at the 2012 American Water Resources Association Conference in Jacksonville, FL, held November 12th-15th.

On November 13th a Conference call between ORNL (Paul Leiby, Rocío Uría-Martínez and Maxwell Brown), Exelus and Ceres was held to discuss Biomass Research and Development Initiative (BRDI) project status. This project (“Technology to Enable Local Production of Biofuels from Energy Crops”) investigates the feasibility and benefits of a novel biofuel production pathway that introduces innovations in feedstock types and conversion process. Ceres is developing drought-resistant and salt-resistant energy crop varieties while Exelus’ conversion process is characterized by feedstock flexibility and lower biorefinery capital costs that make small biorefineries competitive. ORNL’s role in the project is modeling the proposed biofuel production pathway alongside others to evaluate its economic and environmental sustainability.

Misha Krassovski gave the oral presentation "Observational Data and Metadata publication into the Earth System Grid Federation" at the Earth System Grid Federation Face-to-face 2012 Developers Workshop.

On November 13th Maggie Davis organized and led a working group webinar for the ISO Project Committee on Sustainability Criteria for Bioenergy to support preparation of a January report to the plenary on the state of the science of indirect effects.

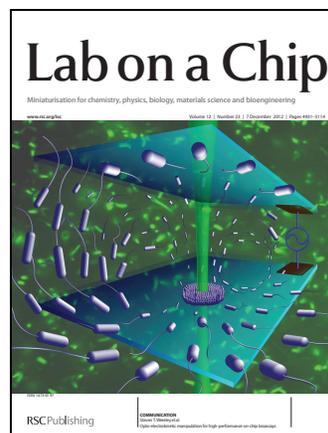
During November 13th-15th ORNL DAAC Manager, Chris Lenhardt attended the Earth Science Data System Working Groups (ESDSWG) Annual Meeting in Annapolis, MD.

During November 13th-16th the poster “Developing a Framework for Climate Risk Management in the Biofuels Industry” was presented at the Southeast Climate Consortium Fall Meeting in Tifton, GA. Co-authors are N. E. Breuer and M. H. Langholtz.

Jeremy Smith was quoted in the article “Oak Ridge and NVIDIA Unveil Titan Supercomputer” on the *Washington Post* website. Read the article online at http://www.washingtonpost.com/blogs/innovations/post/oak-ridge-and-nvidia-unveil-titan-supercomputer/2012/10/28/78bf2e98-2110-11e2-8448-81b1ce7d6978_blog.html. Jeremy was also quoted in the BBC article “Building Titan: the ‘world’s fastest’ supercomputer” (<http://www.bbc.com/future/story/20121026-a-supercomputing-titan/3>) and the NPR article “Why is this Supercomputer So Superfast?” (<http://www.npr.org/blogs/alltechconsidered/2012/10/29/163894669/why-is-this-supercomputer-so-superfast>).

Amy Wolfe provided comments and participated in Q&A in the Environmental Protection Agency (EPA) Region 7 Pollution Prevention Roundtable meeting/conference call on November 14th. Federal Energy Management Program (FEMP) project team member, E. Malone (Pacific Northwest National Laboratory) gave a presentation for attendees who are responsible for providing technical assistance to others.

Graphics from Alope Kumar's article "Opto-electrokinetic manipulation for high-performance on-chip bioassays" in *Lab on a Chip* has been selected as cover art. Co-authors include Jae-Sung Kwon, Sandeep P. Ravindranath, Joseph Irudayaraj and Steven T. Wereley. Read the article online at <http://pubs.rsc.org/en/content/articlelanding/2012/lc/c2lc40662d>.



During November 14th-15th Dave Muth from Idaho National Laboratory (INL) visited to plan for collaboration on Feedstock Supply and Logistics (FSL) and Sustainability. Discussions and presentations are as follows:

- Matt Langholtz presented an FSL overview.
- Dave Muth presented on the National Residue Assessment and Residue Removal Tool.
- Esther Parish presented on Sustainability.
- Maggie Davis presented on International Bioenergy and Brazil collaborations.
- Yetta Jager presented on Water Quality.

On November 15th Keith Kline participated as an invited panelist on sustainability standards at the "4th International Conference on Biofuels Standards" hosted by the National Institute of Standards and Technology (NIST) in Gaithersburg, MD.

The Young Evolving Scientists Seminar Series (YESSS) held a group meeting on November 15th. Sonya Clarkson led the discussion with brief updates on committee formation and the planning of YESSS activities. Items being planned include an orientation manual for new hires, proposal writing workshops, tours of ORNL user facilities and reorganization of the YESSS website. Donna Kridelbaugh also presented a career development seminar entitled "Proactive approaches for building a professional network." The slides are posted on the YESSS website. YESSS is a professional support group for early career science professionals (at all levels) within BESD research programs. The meetings are held the 3rd 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>

Dave Bjornstad attended the Annual Meeting of the Economic Science Association: Experimental Economics in Tucson, AZ, during November 15th-17th. The Economic Science Association is the world's leading organization in using controlled experiments, populated by human subjects facing financial incentives, to test predictions made by economic theory and to integrate findings from behavioral cognitive psychology into mainstream economics.

On November 16th Esther Parish and Virginia Dale participated in two conference calls with Molly Jahn and others about the opportunities for Knowledge Systems for Sustainability to adopt ORNL's sustainability approach and the Vonore work as a case study.

During November 16th-17th Keith Kline participated in the International Energy Agency (IEA) Task 38 workshop on time and emission accounting via remote (web-based) access; the workshop was in Vienna, Austria.

Boualem Hadjerioua visited Clean Power in Kristiansund, Norway, during November 17th-25th to assess and evaluate the turbinator technology that will be shipped and installed for the first time to the U.S. for the 45-Mile Irrigation Canal Project in Portland, OR. ORNL was awarded funding to assess, evaluate and report to DOE for the pre- and post-installation phases of the technology findings. The developer is waiting for the ORNL report to send funding to supplier to start manufacturing the technology in Germany. The report will summarize the results of factory acceptance tests as compared to the field performance for the first Turbinator deployed in Norway.

Ranjeet Devarakonda has become a member of the Editor Board for the journal *Earth Science Information* (Springer).

Bob Cook and Suresh K. SanthanaVannan from the ORNL DAAC held a telecon with Ron Weaver and Marilyn Kaminski to discuss Icebridge. The ORNL DAAC is investigating the possibility of reusing Icebridge metadata, spatial, and data portal tools developed for archive of Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) and Airborne Microwave Observatory of Subcanopy and Subsurface (AirMOSS) data products.

On November 21st Virginia Dale shared information about ORNL's perspectives on sustainability with Tim Volk, Co-Director of the Center for Sustainable and Renewable Energy at the State University of New York and a part of a new AFRI CAP project: Northeast Woody Biomass (NEWBio) Consortium for Sustainable Woody Biomass Feedstocks. The new project is interested in adopting the approach developed by ORNL.

Yaxing Wei attended the DataONE Provenance Working Group weekly telecon to discuss the integration of scientific workflows with DataONE cyber infrastructure. Advanced and easy-to-use tools for scientific workflow (VisTrails, Taverna, etc.) can assist NASA's research communities in conducting and reproducing complex analyses.

During November 26th-28th ORNL hosted "Knowledge Systems for Sustainability – Advancing Toward Prototypes" with the University of Wisconsin-Madison. The workshop seeks to advance collaboration and information sharing among representatives of major projects promoting sustainable landscape management. Vonore is being considered as a case study.

In November T. J. Blasing conducted peer review of a manuscript for the journal, *Environmental Science and Policy*.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) visited ORNL on November 26th and Brennan Smith gave a presentation entitled "Energy Water Ecosystem Research at ORNL."

During November 26th-30th Bob Cottingham, Miriam Land, and Meghan Drake attended the DOE Systems Biology Knowledgebase (KBase) November Build at Argonne National Laboratory for tasks involving Infrastructure and Outreach. Learn more about KBase at <http://kbase.us/>.

Brennan Smith attended the National Hydropower Association (NHA) meeting during November 27th-29th to discuss specific DOE projects.

ORNL DAAC Deputy Manager, Tammy Beaty, and ORNL DAAC Metadata Coordinator, Les Hook, attended the Earth Observing System Data and Information System (EOSDIS) Metadata Workshop at Goddard Space Flight Center (GSFC), Greenbelt, MD, on November 28th.

During November 29th-December 1st Virginia Dale was a presenter and panelist for the Bioenergy Futures: Technical Feasibility Meets Social Sustainability Workshop at Michigan State University.

BESD New Arrivals

William Nettles IV reported to work in November, working as a research staff member on the Spruce and Peatland Responses Under Climatic and Environmental Change (SPRUCE) project with Paul Hanson in ESD's Ecosystem Science group.