Monthly Newsletter for the Biosciences & Environmental Sciences Divisions (B&ESD) April 2013

Pubs and Products

Bevelhimer, M. S., Cada, G. F., Fortner, A. M., Schweizer, P. E., and K. P. Riemer. 2013. Laboratory studies of the short-term responses of freshwater fish to electromagnetic fields. *Trans. Am. Fish. Soc.* 142: 802-813.

Brown, S. D., Utturkar, S. M., Arkin, A. P., Deutschbauer, A. M., Elias, D. A., Hazen, T. C., and R. Chakraborty. 2013. Draft genome sequence for *Desulfovibrio africanus* strain PCS. *Genome Announc.* 1: e00144-13.

Czarnecki, O., Yang, J., Weston, D. J., Tuskan, G. A., and J. G. Chen. 2013. A dual role of strigolactones in phosphate acquisition and utilization in plants. *Int. J. Mol. Sci.* 14: 7681-7701.

De Kauwe, M. G., Medlyn, B. E., Zaehle, S., Walker, A. P., Dietze, M. C., Hickler, T., Jain, A. K., Luo, Y., Parton, W. J., Prentice, I. C., Smith, B., Thornton, P. E., Wang, S., Wang, Y.-P., Wårlind, D., Weng, E., Crous, K. Y., Ellsworth, D. S., Hanson, P. J., Kim, H.-S., Warren, J. M., Oren, R., and R. J. Norby. 2013. Forest water use and water use efficiency at elevated CO2: a model-data intercomparison at two contrasting temperate forest FACE sites. *Glob. Chang. Biol.* 19: 1759–1779.

Elkins, J. G., Hamilton-Brehm, S. D., Lucas, S., Han, J., Lapidus, A., Cheng, J.-F., Goodwin, L. A., Pitluck, S., Peters, L., Mikhailova, N., Davenport, K. W., Detter, J. C., Han, C. S., Tapia, R., Land, M. L., Hauser, L., Kyrpides, N. C., Ivanova, N. N., Pagani, I., Bruce, D., Woyke, T., and R. W. Cottingham. 2013. Complete genome sequence of the hyperthermophilic sulfate-reducing bacterium *Thermodesulfobacterium geofontis* OPF15^{T}. *Genome Announc.* Available online. DOI: 10.1128/genomeA.00162-13

Jager, H. I., Peterson, D. L., Farrae, D., and M.S. Bevelhimer. 2013. A population model to assess influences on the viability of the Shortnose Sturgeon population in the Ogeechee River, Georgia. *Trans. Am. Fish. Soc.* 142: 731-746.

Podar, M., Makarova, K. S., Graham, D. E., Wolf, Y. I., Koonin, E. V., and A. L. Reysenbach. 2013. Insights into archaeal evolution and symbiosis from the genomes of a nanoarchaeon and its inferred crenarchaeal host from Obsidian Pool, Yellowstone National Park. *Biol Direct*. Available online. DOI: 10.1186/1745-6150-8-9.

Qiu, Y., Nagarajan, H., Embree, M., Shieu, W., Abate, E., Juárez, K., Cho, B.-K., Elkins, J. G., Nevin, K. P., Barrett, C. L., Lovley, D. R., Palsson, B. O., Zengler K. 2013. Characterizing the interplay between multiple levels of organization within bacterial sigma factor regulatory networks. *Nat. Comm.* 4:1755.

Saeki, T., Maksyutov, S., Saito, M., Valsala, V., Oda, T., Andres, R. J., Belikov, D., Tans, P., Dlugokencky, E., Yoshida, Y., Morino, I., Uchino, O., and T. Yokota. 2013. Inverse modeling of CO_2 fluxes using GOSAT data and multi-year ground-based observations. *SOLA* 9: 45-50.

Sharma, P., Mayes, M. A., and G. Tang. 2013. Role of soil organic carbon and colloids in fate of TNT, RDX and HMX in training range soils. *Chemosphere* Available online. DOI: 10.1016/j.chemosphere.2013.03.028

Tiegs, S. D., Clapcott, J. E., Griffiths, N. A., and A.J. Boulton. 2013. A standardized cotton-strip assay for measuring organic-matter decomposition in streams. Ecol. Indic. 32: 131-139.

Trupiano, D., Yordanov, Y., Regan, S., Meilan, R., Tschaplinski, T. J., Scippa, G. S., and V. Busov. 2013. Identification and characterization an AP2/ERF transcription factor that promotes adventitious, lateral root formation in *Populus*. *Planta* Available online. DOI 10.1007/s00425-013-1890-4

Wang, Z.-W., Lee, S.-H., Elkins, J. G., Li, Y., Hamilton-Brehm, S. D., and J. L. Morrell-Falvey. 2013. Continuous live cell imaging of cellulose attachment by microbes under anaerobic and thermophilic conditions using confocal microscopy. *J. Environ. Sci.* DOI: 10.1016/S1001-0742(12)60104-1

Ye, C.-Y., Li, .T, Yin, H., Weston, D. J., Tuskan, G. A., Tschaplinski, T. J., and X. Yang. 2013. Evolutionary analyses of non-family genes in plants. *Plant J.* 73: 788-97.

Zhou, A., Baidoo, E., He, Z., Mukhopadhyay, A., Baumohl, J. K., Benke, P., Joachimiak, M. P., Xie, M., Song, R., Arkin, A. P., Hazen, T. C., Keasling, J. D., Wall, J. D., Stahl, D. A., and J. Zhou. 2013. Characterization of NaCl tolerance in Desulfovibrio vulgaris Hildenborough through experimental evolution. *ISME J.* DOI:10.1038/ismej.2013.60

Notable Achievements

Chris Schadt, David Weston and Jerry Tuskan attended the 2013 DOE Joint Genome Institute 8th Annual Genomics of Energy & Environment Meeting in Walnut Creek, California. Both Chris Schadt and David Weston were featured speakers in the Metagenomics and Microbial Genomics sessions, respectively. Chris presented "Roles of Genotype-by-Environment Interactions in Shaping the Root-associated Microbiome of *Populus.*"

Rich Norby was a co-organizer of a workshop at the Interamerican Development Bank in Washington, D.C., during April 3rd-4th, on designing a Free-Air CO_2 Enrichment (FACE) experiment in the Amazon rain forest. The workshop is described here: http://www.nature.com/news/experiment-aims-to-steep-rainforest-in-carbon-dioxide-1.12855.

During April 2nd-4th Virginia Dale was the guest plenary speaker at the 2013 Conference on Invasion Biology, Ecology and Management Conference in Lexington, KY. She presented "Land use in the context of species' invasions, climate change, and energy choices."

Rich Norby was a co-organizer of a "Workshop on How to Assess the Impact of High CO_2

Environment on the Stability of the Amazon Forest," held at the Interamerican Development Bank in Washington, DC, during April 3rd-4th. The discussions at the workshop were summarized in *Nature*:
http://www.nature.com/news/experiment-aims-to-steep-rainforest-in-carbon-dioxide-1.12855.

During April 3rd-5th the DOE Systems Biology Knowledgebase project (KBase) held its all-hands meeting in Emeryville, CA. Discussions of developments over the past year and strategies for a path forward were discussed.

Shih-Chieh Kao and Brennan Smith attended National Hydropower Asset Assessment Program – New Stream Reach Development (NHAAP-NSD) meetings in Washington, DC, on April 4th. Brennan also attended the Hydro Research Foundation (HRF) Fellows Selection meeting.

On April 4th DOE sent out a press release in which the renewal of the BioEnergy Science Center (BESC) along with that of the sister Bioenergy Research Centers (BRCs) was officially announced. You can find the DOE press release at:
http://science.energy.gov/news/in-the-news/2013/04-04-13/
ORNL also released the following:
http://www.ornl.gov/info/features/get_feature.cfm?FeatureNumber=f20130404-00.

Natalie Griffiths participated in the "Stream ecosystem responses to nutrient enrichment at multiple trophic levels" synthesis workshop meeting on April 4th and 5th in at the National Ecological Observatory Network in Boulder, CO.

The son of Sindhu Jagadamma (Environmental Sciences Division [ESD]) and Sujithkumar Surendran Nair (Climate Change Science Institute [CCSI]) won the state geography bee. He was featured in articles in both the *Oak Ridger* (http://www.oakridger.com/article/20130407/NEWS/130409942) and the *News Sentinel* (http://www.knoxnews.com/news/2013/apr/11/this-oak-ridge-7th-grader-knows-the-world/).

Boualem Hadjerioua made a site visit to Vanderbilt (Nashville, TN) April 5th to discuss status, preliminary results, and process to move forward with Water Quality modeling and model reduction techniques for the Cumberland River system.

Sabornie Chatterjee and Candice Halbert organized a tour of the Spallation Neutron Source (SNS) for the Young Evolving Scientists Seminar Series (YESSS) group on April 5th. The facility tour was led by instrument scientist, John Ankner. In addition to a tour of the beam lines, the group was encouraged to contact instrument scientists to first discuss ideas for submitting a user proposal and to check out more information about proposal guidelines on the SNS website.

Jeff Nichols (Computational Sciences & Engineering Division [CSED]), Bai Yang, Dan Ricciuto, and Dale Kaiser prepared and administered the Meteorology exam in Division B (grades 6-9) of the Tennessee Science Olympiad State Tournament (http://tnscioly.utk.edu/state-tournament/) on April 6th at the University of Tennessee-Knoxville (UTK). T.J. Blasing also took part by preparing some challenging degree-day questions that were included on the test. In addition, local news station WATE's Matt Hinkin prepared a 2-minute mock weather forecast video for the test in which he planted several errors/misstatements that students were asked to catch and correct. Each year the meteorology exam has a different flavor, and this year's was "Everyday Weather"

(described at http://www.sciencenc.com/tournament-information/state-tournament/2013%20Rules%20for%20State%20Tournament/Division%20B/meteorologyb2013.pdf). The Bearden Middle School team was really into this event. They easily attained the highest score on the Meteorology exam out of 18 teams and they also won the overall event (http://tnscioly.utk.edu/files/2013/04/2013-Division-B-results.pdf).

Brian Davison was featured in an interview in *Industrial Biotechnology* concerning the future landscape of industrial biotechnology and how bio-based innovation will help drive global bioeconomy. Read the interview online at http://online.liebertpub.com/doi/full/10.1089/ind.2013.1561.

On April 8th Terry Hazen discussed his recent research at the American Chemical Society (ACS) meeting in New Orleans, LA, concerning the increased natural ability of the Gulf of Mexico to clear oil spills. This news was widely reported in news outlets including:

- The ACS website: Gulf of Mexico has greater-than-believed ability to self-cleanse oil spills. http://portal.acs.org/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_ARTICLEMAIN&node_id=222&content_id=CNBP_032560&use_sec=true&sec_url_var=region1&__uuid=3ee2eb0e-fbb1-457d-bcc2-fca77623065f
- ScienceDaily: Gulf of Mexico Has Greater-Than-Believed Ability to Self-Cleanse Oil Spills. http://www.sciencedaily.com/releases/2013/04/130408152733.htm
- BBC News: Deepwater Horizon: Gulf of Mexico 'deep-cleaned' itself. http://www.bbc.co.uk/news/science-environment-22075182
- Phys.Org: Gulf of Mexico has greater-than-believed ability to self-cleanse oil spills. http://phys.org/news/2013-04-gulf-mexico-greater-than-believed-ability-self-cleanse.html
- Ottawa Citizen: Gulf of Mexico cleans itself naturally from Deepwater Horizon blowout. http://www.ottawacitizen.com/news/Gulf+Mexico+cleans+itself+naturally+from+Deepwater+Horizon+blowout/8212074/story.html
- CNN TV (Interview): Gulf of Mexico Has Surprising "Innate" Ability to Cleanse Oil Spills.
- CBS Radio: (Interview, Barry Bognato) Gulf of Mexico Has Surprising "Innate" Ability to Cleanse Oil Spills.
- US News and World Report: Study: Oil-Eating Bacteria Mitigated Deepwater Horizon Oil Spill. http://www.usnews.com/news/articles/2013/04/08/study-oil-eating-bacteria-mitigated-deepwater-horizon-oil-spill
- UT News: UT Professor's Research Shows Gulf of Mexico Resilient After Spill. http://www.utk.edu/tntoday/2013/04/08/professors-research-shows-gulf-mexico-resilient-spill/
- Nature World: Oil From Deepwater Horizon Spill Broken Down By Hungry Ocean Bacteria, Researcher Says. http://www.natureworldnews.com/articles/1269/20130408/oil-deepwater-horizon-spill-broken-down-hungry-ocean-bacteria-researcher.htm
- BBC Radio Live 5 (Radio Interview): Deepwater Horizon: Gulf of Mexico 'deep-cleaned' itself.
- UPI: Microbes ate Macondo oil in Gulf of Mexico. http://www.upi.com/Business_News/Energy-Resources/2013/04/09/Microbes-ate-Macondo-oil-in-Gulf-of-Mexico/UPI-16111365512907/

- Glasgow Wired: Deepwater Horizon: Gulf of Mexico 'deep-cleaned' itself. http://www.glasgowwired.co.uk/news.php/1477336-Deepwater-Horizon-Gulf-of-Mexico-deep-cleaned-itself
- Edinburgh Wired: Deepwater Horizon: Gulf of Mexico 'deep-cleaned' itself. http://www.edinburghwired.co.uk/news.php/1477336-Deepwater-Horizon-Gulf-of-Mexico-deep-cleaned-itself

During April 8th-11th, Yetta Jager presented "Shaping seasonal flows for salmon and energy" at the Spring Runoff Conference as a keynote speaker in Logan, UT.

During April 8th-12th Brian Davison participated at the BioScience BioEnergy Centre (BSBEC) retreat in Crewe, United Kingdom, as part of their Science and Industrial Advisory board. BSBEC does research in willow, Miscanthus, and straw conversion research as well as Clostridial, yeast and other conversion technologies. BSBEC is a centre including Rothamsted, Nottingham, Dundee, Cambridge and other sites.

Nicole Samu attended the Association of American Geographers Annual Conference in Los Angeles, CA, during April 8th – 14th.

On April 9th Keith Kline served on a panel organized by the University of Tennessee, AmeriCorps and Peace Corps to share experiences from Volunteer service (Peace Corps, 1980-83) and subsequent influences on professional careers. Projects for clean renewable energy including major improved cook stove initiatives were described, and questions from the audience of prospective volunteers were fielded.

Brennan Smith attended the Energy-Water Nexus Initiative/Cades Initiative meeting at ORNL on April 9th.

Mark Bevelhimer attended a meeting of the Federal Energy Regulatory Committee (FERC) and spoke to 60-70 people on the electromagnetic field (EMF) and acoustics work.

During April 9th-13th Latha Baskaran presented "Cross-Scale Analysis of Factors Affecting Aquatic Macroinvertebrate Distribution in Tennessee" at the Association of American Geographers (AAG) annual meeting in Los Angeles, CA.

During April 10th-11th Mark Bevelhimer attended the 2013 Global Marine Renewable Conference in Washington, DC.

On April 12th in Nashville, Mark Peterson presented recent findings from the Biological Monitoring and Abatement Program (BMAP) to Tennessee Department of Environment and Conservation (TDEC) staff. The TDEC Commissioner was in attendance. The meeting was video-conferenced to the Environmental Protection Agency (EPA)-Atlanta and TDEC DOE-Oversight office in Oak Ridge. Many of the concepts presented are a component of surface water strategies identified by the Scientific Opportunities for Monitoring at Environmental Remediation Sites (SOMERS) framework, which is partially funded by the Mercury Applied Field Research Initiative (AFRI).

During April 14th-18th Esther Parish and Virginia Dale presented at the annual symposium of the

U.S. chapter of the International Association of Landscape Ecologists in Austin, TX. Virginia presented "Selecting and Deploying Indicators for Sustainability of Bioenergy Systems," and Esther presented "Land use in the context of species' invasions, climate change, and energy choices."

The title of "2013 Distinguished Landscape Ecologist" was awarded to Virginia Dale by the United States Regional Association of the International Association for Landscape Ecology.

The Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) Manager, Suresh K. SanthanaVannan, and Chief Scientist, Bob Cook, attended the Moderate Resolution Imagine Spectroradiometer (MODIS) Science Team meeting, April 15th-17th, in Silver Spring, MD.

From ORNL Bob Cottingham, Dave Weston, Priya Ranjan, and Mustafa Syed attended the Plant Science Retreat for the DOE Systems Biology Knowledgebase (KBase) Project at Cold Spring Harbor Laboratory in Cold Spring Harbor, NY.

Mitch Doktycz has been invited to take part in the Enabling Bioanalytical and Imaging Technologies (EBIT) review panel, scheduled for June 6th and 7th in Washington DC.

The Young Evolving Scientists Seminar Series (YESSS) held its monthly meeting on April 18th. Rocio Uria Martinez presented her research on "Evaluating the Economic Potential for New Pumped Storage Hydropower in the United States". YESSS is a professional support group for early career science professionals (at all levels) within the Biosciences and Environmental Sciences Divisions (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.

On April 22nd 'Debo Oladosu attended the session on "Industrial Biotech and the Renewable Fuels Standard: Impact on the Biobased Economy" at the BIO International Convention. Zia Haq, Analysis Program Manager at the Bioenergy Technologies Office (BETO), presented an overview of the biofuel activities at DOE and discussed recent findings from published project paper on "Global economic effects of U.S. biofuel policy and the potential contribution from advanced biofuels."

Brennan Smith, Shih-Chieh Kao and Boualem Hadjerioua attended the National Hydropower Association 2013 Annual Conference. Shih-Chieh Kao presented "Hydropower New Stream-reach Development Resource Assessment-Introduction and Status Update" in Washington, DC., during April 21st-23rd.

Boualem Hadjerioua attended the National Center for Atmospheric Research (NCAR) Impacts, Adaptation, and Vulnerability (IAV) Collaboration business meeting at ORNL during April 22nd-23rd.

Mark Bevelhimer attended the Global Marine Renewable Energy Conference in Washington, DC, on April 25th.

Svjetlana Stekovic presented "Numerical modeling of turbulent von Karman vortex shedding in wake of cylinder" at the Spring 2013 Poster Session at ORNL on April 25th.

Sonya Clarkson presented a BioEnergy Science Center (BESC) poster at the 35th Symposium on Biotechnology for Fuels and Chemicals in Portland, Oregon titled: Physiological response of *Clostridium thermocellum* to biomass-derived growth inhibitors. Co-authors were Sonya Clarkson, Sarah Kauffman, Adam Guss, and Jim Elkins.

The article, "UGA is an additional glycine codon in uncultured SR1 bacteria from the human microbiota," with ORNL co-authors, Jim Campbell, Alicia Campbell, and Mircea Podar, has been selected to be an F1000Prime article. Read the original article in PNAS at http://www.pnas.org/content/110/14/5540.full?sid=71e483ec-69df-42e7-bd65-b60e4596164a. F1000Prime recognizes important and impactful research publications as selected by its members in science and academia.

The United States Geological Survey (USGS) has released a new service called Biodiversity Information Serving Our Nation (BISON). BISON, a collaboration between USGS and ORNL, is a unique, web-based Federal resource of unprecedented size for finding species in the U.S. and territories. Biva Shrestha, Ranjeet Devarakonda and Giri Palanisamy are part of the BISON development team and are currently responsible for data processing and cyber-infrastructure for this project. Other notable ORNL contributors are Harold Shanafield, Dave Sill, Pete Eby and Anthony Clodfelter. Read the USGS press release at http://www.usgs.gov/newsroom/article.asp?ID=3566.

ORNL Toxicology and Hazard Assessment Team staff members responded to quick-turn-around requests from the National Homeland Security Research Center (EPA) for toxicological information on ricin and ammonia. These requests resulted from tainted letters found in U.S. mail and the fertilizer plant explosion in Texas.

Boualem Hadjerioua attended a meeting at the Tennessee Valley Authority (TVA) to discuss the ability to scale-up existing TVA code/paradigms for fine-scale water quality and instream hydrodynamic computational modeling/short-term forecasting on April 26th.

Yetta Jager applied for and was re-appointed to the adjunct faculty in the Ecology and Evolutionary Biology Department at the University of Tennessee, Knoxville.

Dwayne Elias has been invited to become an academic editor for the journal *PLOS One*.

Yetta Jager served on the search committee for a new director of UTK's National Science Foundation (NSF) National Institute of Mathematical and Biological Synthesis to replace Dr. Lou Gross. The committee conducted interview visits with two candidates during April.
Abhijeet Borole presented the seminar, "Waste to Energy: Biofuel Cells and BioEnergy Production" on April 27 in association with Science Saturdays by the Oak Ridge Associated Universities (ORAU). Learn more about Science Saturdays at http://www.orau.org/science-saturdays/. Also, see Abhijeet's presentation on YouTube at http://www.youtube.com/watch?v=bWYYPgfGd54.

The Carbon Dioxide Information Analysis Center (CDIAC) has updated the monthly data included in NOAA's United States Historical Climatology Network (USHCN; http://cdiac.ornl.gov/epubs/ndp/ushcn/ushcn.html) dataset through 2012. The update, dubbed

Version 2.5, replaces Version 2.0 and reflects modifications to the underlying database made by its compilers at the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC). As in earlier versions, the files include average, maximum, and minimum temperature, and precipitation amount from 1218 stations across the contiguous U.S. A graphical user interface (http://cdiac.ornl.gov/epubs/ndp/ushcn/ushcn_map_interface.html) enables plotting and downloading of data from individual stations.

Chris Schadt, Jessy Labbé and Mike Robeson traveled to Duke University on April 29th-30th to meet with Plant Microbe Interfaces (PMI) Science Focus Area (SFA) collaborators Rytas Vilgalys and Gregory Bonito. They toured the facilities at Duke University where a number of core facilities exist of which the PMI project can take advantage. This trip furthered collaborative efforts in the fungal genomics portion of the PMI SFA. Mike and Jessy both gave presentations at the Department of Biology Seminar series; Mike presented "Analysis of fungal and bacterial communities using QIIME" and Jessy presented "Deciphering the genetics of ectomychorrhizal symbiosis between *Populus* and *Laccaria."*

Bob Cook, Suresh K. SanthanaVannan, Tammy Beaty and Yaxing Wei attended the National Aeronautics and Space Administration (NASA) Terrestrial Ecology Science Team Meeting (La Jolla, CA).

- Suresh K.S. Vannan presented a poster on the ORNL DAAC data center activities
- Tammy Beaty, Bob Cook, Suresh Vannan, and Yaxing Wei conducted a workshop on data management best practices for early career scientists
- Yaxing Wei presented a poster on Modeling and Synthesis Thematic Data Center (MAST-DC) activities

Terry Hazen is quoted in an April 28th article in the News Sentinel: BP oil spill gone from deep ocean, but remains in marshes. Read the article online at http://www.knoxnews.com/news/2013/apr/28/ut-experts-bp-oil-spill-gone-from-deep-ocean-but/.

Anthony Turhollow presented "Implications of the 2012 Drought on Feedstock Availability and the Developing Cellulosic Biofuels Industry" at the 35th Symposium on Biotechnology for Fuels and Chemicals in Portland, OR, on April 30th.

Ben McMurry attended the Earth Observing System (EOS) Clearinghouse (ECHO) Workshop in Greenbelt, MD.

BESD New Arrivals

Bibi Naz joined the Energy Water Ecosystem Engineering group as a post-doctoral research associate. Bibi graduated from Purdue University in 2011 and has been a post-doctoral fellow at the University of Washington. She is an experienced Hydrologic Modeler, and will be working with Shih-Chieh Kao on assessing the potential climate change impact on Hydropower generation and water availability.