

B&ESD Newsletter
May 2011

Pubs and Products

Bedane, A. H., Afzal, M. T., and S. Sokhansanj. 2011. Simulation of temperature and moisture changes during storage of woody biomass owing to weather variability. *Biomass Bioenerg.* 35: 3147-3151.

Brown, S. D., Wall, J. D., Kucken, A. M., Gilmour, C. C., Podar, M., Brandt, C. C., Teshima, H., Detter, J. C., Han, C. S., Land, M. L., Lucas, S., Han, J., Pennacchio, L., Nolan, M., Pitluck, S., Woyke, T., Goodwin, L., Palumbo, A. V., and D. A. Elias. 2011. Genome sequence of mercury-methylating and pleomorphic *Desulfovibrio africanus*. *J. Bacteriol.* Available online. DOI:10.1128/JB.05223-11

Dale, V.H. 2011. The role of disturbance in seasonally dry tropical forest landscapes. In W. McShea, J. S. Davies, & N. Bhumpakphan (Eds.), *The Ecology and Conservation of Seasonally Dry Forests in Asia*. (pp. 75-97). Washington, DC: Smithsonian Institution Scholarly Press.

Devarakonda, R., Hook, L., Palanisamy, G., and J. Green. 2011. Next-generation search engines for information retrieval. *Int. J. Softw. Eng. (IJSE)* 2: 1-12.

Devarakonda, R. and H. Shanafield. 2011. Drupal: collaborative framework in science research. IEEE International Symposium on Collaborative Technologies and Systems (CTS).

Efroymson, R. A., Ichida, A., Armstrong, A., and J. Lee. 2011. U.S. Environmental Protection Agency. Problem formulation for human health risk assessments of pathogens in land-applied biosolids. National Center for Environmental Assessment, Cincinnati, OH, EPA/600/R-08/035F.

Ghafghazi S., T. Sowlati, S. Sokhansanj, X. Bi. 2011. Particulate matter emissions from combustion of wood in district heating applications. *Renew. Sust. Energ. Rev.* 15: 3019-3029.

Gu, B., Dong, W., Liang, L., and N. A. Wall. 2011. Dissolution of technetium(IV) oxide by natural and synthetic organic ligands under both reducing and oxidizing conditions. *Environ. Sci. Technol.* Available online. DOI:10.1021/es200110y

Guo, J., Jin, Z., Yang, X., Li, J. F., and J. G. Chen. 2011. Eukaryotic Initiation Factor 6, an evolutionarily conserved regulator of ribosome biogenesis and protein translation. *Plant Signal Behav.* 6: 766-771.

Guo, J., Yang, X., Weston, D. J., and J. G. Chen. 2011. Abscisic acid (ABA) receptors: past, present and future. *J. Integr. Plant Biol.* Available online. DOI: 10.1111/j.1744-7909.2011.01044.x

Romero-Lankao, P., Gnatz, D. M. and T. Wilbanks. 2011. Chapter 7: Conclusion and policy directions. In *Cities and Climate Change, Global Report on Human Settlements 2011*, United Nations Human Settlements Programme (pp. 43-49). Washington, DC: Earthscan.

Schaefer, J. K., Rocks, S. S., Zheng, W., Gu, B., Liang, L., and F. M. M. Morel. 2011. Active transport, substrate specificity, and methylation of Hg(II) in anaerobic bacteria. *Proc. Natl. Acad. Sci. USA*. 108: 8714-8719.

Shi, X., Mao, J., Thornton, P. E., Hoffman, F. M., and W. M. Post. 2011. The impact of climate, CO₂, nitrogen deposition and land use change on simulated contemporary global river flow, *Geophys. Res. Lett.* 38: L08704.

Wilbanks, T. J. 2011. Inducing transformational energy technological change. *Energ. Econ.* 33: 699-708.

Zhang, F., Luo, W., Parker, J. C., Brooks, S. C., Watson, D. B., Jardine, P. M., and B. Gu. 2011. Modeling uranium transport in acidic contaminated groundwater with base addition. *J. Hazard. Mater.* 190: 863-868.

Notable Achievements

Melanie Mayes has received a Citation of Excellence for Associate Editors related to her service as an Associate Editor for the Soil Science Society of America Journal. She received both a certificate from the Society and will be featured in an upcoming article in the *CSA News*, the official magazine for members of the Crop Science Society of America, Soil Science Society of America, and American Society of Agronomy.

On May 2nd Esther Parish judged the Dyllis Elementary School Science Fair alongside Ken Tobin, Director for the Measurement Science and Systems Engineering Division (MSSED), and Shaun Gleason, Leader of the MSSED Imaging, Signals and Machine Learning Group. Approximately 30 fourth-graders and one third-grader participated in this second annual event organized by fourth grade science teacher, Mrs. Annette Tullock. The top three projects were related to biology and physics.

On May 2nd-5th a number of members of the Biosciences Division (BSD) and the Environmental Sciences Division (ESD) attended the 33rd Symposium on Biotechnology for Fuels and Chemicals in Seattle, WA.

The following posters were given:

- "Consolidated Bioprocessing Conversion of Genetically Modified Switchgrass"
Authors: K. Yee, C. Hamilton, M. Rodriguez, Jr., C. Fu, Z.-Y. Wang, and J. R. Mielenz
- "Defined Growth Requirements for Anaerobic Cellulolytic Bacteria in Cocultures"
Authors: D. E. Graham, D. M. Kridelbaugh and J. C. Nelson
- "Deletion analysis of genes involved in *Clostridium thermocellum* electron flux"
Authors: A. M. Guss and L. R. Lynd
- "Heterologous expression of biofuel pathways in *Rhodospirillum rubrum* during growth on carbon monoxide"
Authors: R. Jain, A. P. Borole, Z. K. Yang, S. Hamilton-Brehm, J. R. Mielenz, B. H. Davison, and J. G. Elkins

Also, Robin Graham gave a presentation titled "Indicators to Support Environmental Sustainability of Bioenergy Systems" that was developed by Virginia H. Dale, Allen C. McBride, Latha M. Baskaran, Mark E. Downing, Laurence M. Eaton, Rebecca A. Efroymson, Charles T. Garten Jr., Keith L. Kline, Henriette I. Jager, Patrick J. Mulholland, Esther S. Parish, Peter E. Schweizer, and John M. Storey. Sudhagar Mani (University of Georgia) and Shahab Sokhansanj

gave a presentation on the “Techno-economic assessment of granulation based biomass supply logistics system for a biorefinery.”

The paper “Paradigm for industrial strain improvement identifies sodium acetate tolerance loci in *Zymomonas mobilis* and *Saccharomyces cerevisiae*,” co-authored by a number of members of BSD in 2010 (*PNAS*, 107:10395-10400) has been evaluated for a “Faculty of 1000” (F1000) review. F1000 is a post-publication peer review that helps identify the most important articles in biology and medical research. A peer-nominated group of premier scientists and clinicians rate articles they select and explain their importance. Read more about F1000 at <http://f1000.com/>.

At the request of Alison Goss Eng, Keith Kline and Maggie Stevens developed and submitted talking points and overview slides to be used in future OBP presentations May 4th-31st. The materials highlight international collaborations on bioenergy including those involving the International Organization for Standardization (ISO), Brazil, International Energy Agency (IEA), the Global Bioenergy Partnership (GBEP) and the Intergovernmental Panel on Climate Change (IPCC).

The Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) hosted Dr. Hampapuram Ramapriyan on a tour of the lab Thursday May 5th. The tour included the High Performance Computing Facility, the ORNL Research Library and the Everest visualization. After the tour, Dr. Ramapriyan came to DAAC offices, where discussions were held related to data preservation standards, airborne data archiving, backups, and the cyber attack.

On May 5th an entry featuring a Q+A with Jeremy Smith, “10 Questions for a Biophysicist,” appeared on the U.S. Department of Energy “EnergyBlog.” View the entry online at <http://blog.energy.gov/blog/2011/05/05/10-questions-biophysicist-jeremy-smith>. Jeremy discusses many aspects of his life and work, including the importance of neutron scattering research and his favorite fictional scientist.

An article by Bob Standaert and others at ORNL, “LaPO₄ Nanoparticles Doped with Actinium-225 that Partially Sequester Daughter Radionuclides,” has been highlighted by the American Chemical Society’s (ACS) Noteworthy Chemistry feature. View the highlight at http://portal.acs.org/portal/acs/corg/content?nfpb=true&pageLabel=PP_ARTICLEMAIN&node_id=840&content_id=CNBP_027264&use_sec=true&sec_url_var=region1&uuid=1ad8a2fb-d5c7-427e-83d9-7d251d246e4e#P41_7191. The original article appears in the journal *Bioconjugate Chemistry* (22: 766-776).

The ORNL DAAC was acknowledged in the State of the Birds 2011 Report, http://www.stateofthebirds.org/SOTB_20110504-1200-WEB.pdf (see page 44), which is based in part on Moderate Resolution Imaging Spectroradiometer (MODIS) Land Products. The bird species distribution maps serving as the basis for the report were derived from statistical models that included many environmental driver variables including the MODIS Normalized Difference Vegetation Index (NDVI) product. The ORNL DAAC’s MODIS Web service was used by staff of the Cornell Lab of Ornithology to obtain point based MODIS data for ~150,000 sites in the conterminous U.S. This bird distribution modeling activity originated from a NSF-DataONE collaboration between the Cornell Lab of Ornithology, the ORNL DAAC, and the NSF-Funded TeraGrid computing resources project. Press releases and additional information are available from the following Web sites:

- State of the Birds 2011 Report:
<http://www.stateofthebirds.org>

- http://www.stateofthebirds.org/SOTB_20110504-1200-WEB.pdf
- Secretary of Agriculture Press Release:
<http://www.usda.gov/wps/portal/usda/usdahome?contentid=2011/05/0193.xml&contentidonly=tru>
- Secretary of Interior Press Release:
<http://www.doi.gov/news/pressreleases/AMERICAS-GREAT-OUTDOORS-Secretary-Salazar-Releases-2011-State-of-the-Birds-Report.cfm>
- A library of bird distribution maps is available from the Lab of Ornithology's eBird project:
<http://ebird.org/content/ebird/about/occurrence-maps>

On May 10th Scott Curran, Keith Kline and Virginia Dale met with Richard Venditti and Ronalds Gonzalez from the Department of Forest Biomaterials at North Carolina State University and discussed how they can work together to address Life Cycle Analysis of biofuels.

Bob Cook participated in the DataONE Best Practices for Data Management Workshop, Santa Fe, NM, May 10th-12th.

Ben McMurry and Jim Lay attended the Reverb/Earth Observing System (EOS) Clearinghouse (ECHO) workshop, May 10th-12th, Greenbelt, MD. Reverb provides a streamlined and updated way to search datasets and ECHO hosts large amounts of data. Read more about these programs run by the National Aeronautics and Space Administration (NASA) at http://www.echo.nasa.gov/reverb/about_reverb.htm and <http://www.echo.nasa.gov/>.

Suresh SanthanaVannan, Yaxing Wei and Giri Palanisamy attended the Global Organization for Earth System Science Portals (GO-ESSP) meeting in Asheville, NC, on May 10th-12th.

ESD's Mike Ryon received the 2011 ORNL Community Sustainability Award for his work to improve water quality at a stream running through his neighborhood. After obtaining a watershed grant and with the help of the homeowners' association, neighbors, and Boy Scouts, Ryon planted native trees and shrubs along the stream to help return it to a more natural state. With more work and over 10 years, the stream and surroundings have changed dramatically, and continued improvements are planned. Read more about Mike and his work via ORNL's Sustainable Campus website at <http://sustainability-ornl.org/Documents/Using%20Native%20Plants%20for%20Water%20Quality.pdf>.

ORNL DAAC staff member, Ranjeet Devarakonda, participated in the United States Geological Survey (USGS) National Map User Conference in Denver, CO, May 10th-13th.

On May 11th Virginia Dale and Mark Downing attended the Core University Bioenergy workshop held at ORNL. Approximately 25 faculty from the core universities and 10 staff from ORNL participated. The purpose of this workshop was to share information on ORNL and university bioenergy research activities, priorities, and future plans. The desired outcome is to identify areas of common interest leading to collaborative research and proposal opportunities.

On May 11th Dr. Manuel Garcia-Perez of Washington State University visited Shahab Sokhansanj and his research group to discuss potential collaboration on torrefaction research.

During May 11th-20th Esther Parish completed a mini-term course in modeling methods through the University of Tennessee and taught by visiting ecology professor Marko Debeljak of the Josef

Stefan Institute in Slovenia. She acquired new skills that have the potential to benefit future projects related to bioenergy sustainability and climate change, including:

- 1) Machine learning/data mining techniques to create classification trees, regression trees and predictive modeling trees (using Weka software)
- 2) Compartment modeling with STELLA dynamic ecological modeling software to track flows of matter/energy through a system over time
- 3) Melding of “soft science” and physical parameters to construct a Multi-attribute Decision Support System model.

On May 12th Shahab Sokhansanj participated in the BC Bioenergy Network Conference, Next Generation Biomass Applications: Torrefaction & Forest Sector Solutions, in Vancouver, British Columbia, Canada. Speakers from this conference came mainly from equipment suppliers and international technology providers.

On May 12th-13th Luis Cortez, University of Campinas, Brazil, faculty, Special Projects Coordinator at the Foundation for Research of Sao Paulo (FAPESP - <http://www.fapesp.br/en/>), and member of the Executive Committee for the Global Sustainable Bioenergy Project (GSB), visited ORNL to discuss prospective collaborations and synergies between Brazil and ORNL researchers. One outcome was a plan to submit a joint-proposal for matching funds to support collaborative research on sustainable bioenergy production and land use change.

Also on May 13th Keith Kline, Allen McBride and Virginia Dale participated in a conference call with colleagues from Canada regarding bioenergy sustainability and how to measure it. Canadian participants included Brian Titus, Barbara Kishchuk, Derek Sidders, Lawrence Townley-Smith, Mark Stumborg, David Paré, Evelyne Thiffault, and Jeff Karau. The call was the second in an ongoing series designed to foster communications and collaboration.

On May 16th-20th Keith Kline served as an official U.S. delegate for the International Organization for Standardization (ISO) Project Committee working sessions on "Sustainable criteria for bioenergy" in Frankfurt, Germany. Keith facilitated negotiations to approve resolutions clarifying that this will be a Process Standard and that the issue of indirect effects will be examined by Work Group 4 (WG4), led by Argentina, Canada with the U.S. ORNL also contributed to the complete revision of the draft Standard for greenhouse gas emission calculations and prepared a work plan with mandate, scope and criteria for WG4.

On May 17th-18th Latha Baskaran attended the Frontiers in Bioenergy conference at Purdue University and gave a presentation on “Evaluating bioenergy sustainability using indicators and a watershed-scale optimization model.”

Also on May 17th-18th Virginia Dale attended the Great Lakes Bioenergy Research Center (GLBRC) Sustainability Retreat and Modeling Workshop in South Bend, Indiana.

In collaboration with a team of faculty and students from the University of British Columbia (Biomass & Bioenergy Research Group), on May 17th-18th Shahab Sokhansanj organized a 2-day workshop titled “Biomass Pelletization Workshop.” Held at the University of British Columbia in Vancouver, BC, Canada, the Workshop was attended by more than 100 attendees. Eighty of the attendees were from industry (equipment suppliers, biomass processors). Some of the participants came from Europe, Korea, and South America. Shahab Sokhansanj spoke on “supply systems modeling for agricultural biomass.”

Mitch Doktycz, along with Gerald Tuskan, Jessy Labbé and Tim Tschaplinski attended the 26th

New Phytologist Symposium, Bioenergy Trees, May 17th-19th in Nancy, France. Gerald Tuskan was an invited speaker and presented a talk, “Populus resequencing: towards genome-wide association studies.” Mitch Doktycz, Jessy Labbé and Tim Tschaplinski contributed to posters titled “Plant Microbe Interfaces: Defining and Understanding the Relationship between Populus and its Microbiome” and “Identification of Quantitative Trait Loci and targeting of genes affecting ectomycorrhizal symbiosis in the Poplar.”

On Wednesday, May 18th, Lezlee Dice spoke at Jefferson County High School. Her audience varied from basic biology students to students taking a biotechnology class. She presented a history of ORNL and spoke on the areas of research currently being pursued. Her talk included topics such as lab safety, “a day in the lab,” and how students can get involved in research. Some students were surprised that even as high school students, they can participate in research programs at ORNL. Lezlee spoke to about 70 students and met with faculty members.

On May 18th at the Biosciences Division meeting, two members received awards in the category of 2009 Outstanding Mentor. In order to receive this award, the mentor must be nominated by a previous guest or intern, and the merits of the mentor, as described by the guest, are evaluated. Lee Gunter and Ninell Mortensen both received an award.

Bob Cook, ORNL DAAC Chief Scientist, and Suresh SanthanaVannan, ORNL DAAC Lead Developer, attended the MODIS Science Team Meeting, May 18th-20th, College Park, Maryland.

Jonathan Mielenz, Miguel Rodriguez, Jr., and Choo Hamilton have received Significant Event Awards (SEAs) for “Genetic manipulation of lignin reduces recalcitrance and improves ethanol production from switchgrass” in the first half of 2011. Their work was highlighted in the February *PNAS* paper by the same name. Read their paper online at www.pnas.org/cgi/doi/10.1073/pnas.1100310108.

Natalie Griffiths was recently honored at the 2011 University of Notre Dame commencement ceremony, receiving the Eli J. and Helen Shaheen Graduate School Award for the sciences. These awards are given to the top graduating doctoral student in the humanities, social sciences, science, and engineering fields. Natalie’s citation was as follows:
Natalie Griffiths, a biology Ph.D. whose research provides new insights into the novel pathways of carbon cycling in agricultural streams of the Midwestern United States, and how the byproducts of genetically modified corn left on field after harvest may impact ecosystems, was the recipient in the sciences. She is completing a prestigious postdoctoral position at the Oak Ridge National Laboratory in Tennessee, where she is researching the effects of climate change on nutrient cycling in spruce peat lands and the impacts of bioenergy feed stocks on stream and groundwater quality.

The proposal, “Enhancing expertise in archaeal taxonomy: Classical and molecular-based monographic research of the Nanoarchaeota” has been submitted to the National Science Foundation (NSF) under the Systematic Biology and Biodiversity Inventories Program. It has been recommended for 4 years funding. Mircea Podar is a co-Investigator through the Microbiology Department at the University of Tennessee. The proposal is led by Anna Louise Reysenbach from Portland State University. The recommended total award is \$725K.

On May 20th the U.S. Nuclear Regulatory Commission (NRC) published a Final Environmental Impact Statement (FEIS) for two new nuclear power reactors at the Comanche Peak site about 40 miles southwest of Fort Worth, Texas. The two new units would add to the electric power generated by two existing nuclear reactors that have been in operation since the early 1990s at the

Comanche Peak plant. The 1200-page FEIS was prepared by an ORNL team led by Greg Zimmerman. This FEIS is only the second one that has been completed for the so-called "second generation" of nuclear power reactors to be constructed in the United States. The publication of the Comanche Peak FEIS completes the NRC's environmental review of the proposed reactors. Upon the completion of an in-progress safety review (the hydrology portions of which are being conducted by ESD staff members Brennan Smith and David Watson), the NRC will issue its decision on whether to grant or deny the license application for the two new Comanche Peak units. To date, the NRC has received license applications for a total of 26 such new U.S. nuclear reactor units, and the NRC's individual environmental and safety reviews are underway in various stages of progress.

Many members of BSD attended the American Society of Microbiology meeting in New Orleans, LA, May 21st-24th. The following posters were presented:

- Microbial community in active and upper permafrost layers on Axel Heiberg Island.
Authors: T. A. Vishnivetskaya, B. Stackhouse, N. Mykytczuk, A. C. Layton, S. M. Pfiffner, T. J. Phelps, L. Whyte, and T. C. Onstott.
- Microbial survival and growth under a supercritical-Co₂ atmosphere- Implications of geological sequestration of carbon dioxide.
Authors: H. H. Hernandez, K. C. Peet, T. J. Phelps, S. M. Pfiffner, and J. R. Thompson.
- Genetic and Biochemical Approaches to Identify Mercury Methylation Enzymes in *Desulfovibrio desulfuricans* ND132.
Authors: A. M. Kucken, S. D. Smith, D. A. Elias, and J. D. Wall.
- Bacterial and Fungal Communities Within the Roots and Rhizosphere of *Populus deltoides* in Upland and Lowland Soils.
Authors: N. Gottel, H. F. Castro, M. Kerley, Z. K. Yang, D. A. Pelletier, J. Morrell-Falvey, M. Podar, T. Karpinets, E. Uberbacher, G. A. Tuskan, R. Vilgalys, M. J. Doktycz, and C. W. Schadt.
- *Clostridium thermocellum* Transcriptional Architecture Improvement Using Systems Biology Data and Bioinformatics.
Authors: S. Yang, W-C. Chou, F. Zhou, D. M. Klingeman, Z. Yang, L. Dice, C. M. Johnson, F. Mao, Y. Xu, A. A. Gorin, L. J. Hauser, R. W. Cottingham, D. J. Quest, B. H. Davison, A. V. Palumbo, P. Gilna, M. Keller, and S. D. Brown.
- Sediment Microbial Community Dynamics and Geochemistry During Oxidic and Hypoxic Periods in the Gulf of Mexico.
Authors: A. V. Palumbo, J. J. Mosher, T. A. Vishnivetskaya, S. D. Brown, D. M. Klingeman, C. M. Johnson, and R. Devereux.
- Isolation of Metal Reducing Organisms from Lactate-enriched Contaminated Groundwater.
Authors: J. J. Mosher, T. J. Phelps, S. L. Carroll, M. M. Drake, C. W. Schadt, M. Podar, S. D. Brown, T. C. Hazen, A. P. Arkin, A. V. Palumbo, B. A. Faybishenko, and D. A. Elias.
- New Species and Isolates of *Geobacter*, *Desulforegula* and *Desulfovibrio* Originating from a Low Diversity Consortia During In Situ Reduction of U(VI).
Authors: T. M. Gihring, C. Doktycz, M. Kerley, S. C. Carroll, S. C. Brooks, J. E. Kostka, and C. W. Schadt.
- Genome Sequence Completion Strategy for Recalcitrant Regions Causing Segmented Data.
Authors: R. A. Hurt, S. D. Brown, M. Podar, A. V. Palumbo, D. A. Elias
- Development of a Model Microbial Community for a Systems Biology Level Assessment of Metal-reduction.

Authors: J. G. Moberly, T. J. Phelps, C. W. Schadt, M. Podar, S. D. Brown, Z. K. Yang, M. M. Drake, T. C. Hazen, A. P. Arkin, A. V. Palumbo, and D. A. Elias.

- Firing Range Soils Yield a Diverse Fungal Community Capable of Pb-mineral Solubilization.
Authors: T. Sullivan, C. Schadt, N. Basta, and P. Jardine.
- Small Thiols Enhance Mercury Methylation Rates By Sulfate-Reducing Bacterium *Desulfovibrio desulfuricans* ND132 By Enhancing Hg Solubility.
Authors: C. C. Gilmour, T. Morcol, G. Riedel, J. T. Bell, A. M. Graham, and D. A. Elias.
- Nicole Edwards, Jenny Morrell-Falvey, Dale Pelletier, Chris Schadt and Piro Siuti presented the following posters:
 - “Investigation of the Colonization of Poplar Roots by Rhizosphere-associated Bacteria using Imaging Methods”
 - “Isolation and Functional Characterization of Cultivable Bacteria from the Populus Rhizo-Endosphere”
 - "Azospirillum brasilense Che1-dependent adhesion to abiotic and lectin treated surfaces" and
 - “Characterization of Mobility and Chemotaxis in a Nanoporous Microfluidic Platform.”

Debo Oladosu and Keith Kline provided comments to the Department of Energy (DOE) Office of the Biomass Program on the economic indicators proposed by the Global Bioenergy Partnership (GBEP). ORNL recommendations addressed indicators for "Change in Income," "Gross Value Added" and "Net Economic Contribution." ORNL also suggested several alternatives to a proposed sub-indicator on income distribution.

Natalie Griffiths attended the North American Benthological Society annual meeting from May 22nd-26th in Providence, RI. In a presentation co-authored with Pat Mulholland, she discussed findings on stream biogeochemistry research conducted in the West Fork of Walker Branch.

Also at the North American Benthological Society (NABS) annual meeting, Pat Mulholland received the Award of Excellence. NABS is an international scientific society whose purpose is to understand the structure and functioning of aquatic ecosystems. The Award of Excellence is the society's highest honor, and recognizes Pat's many scientific accomplishments and achievements, particularly his influential research on nutrient and organic carbon dynamics in stream ecosystems. As mentioned in his award citation, Pat has been on the leading edge of benthological research for over 30 years and his scientific accomplishments are unquestionably profound and transformative. He is considered the leading expert on nutrient dynamics in stream ecosystems and has made significant contributions to our understanding on how watershed hydrology influences stream nutrient and organic carbon concentrations. This recognition speaks to his national and international reputation. A long time member of NABS, Pat has served the society in a number of capacities, including member and chair of the Executive Committee and of the Board of the Endowment Trust Committee, and as an Associated Editor of *J-NABS*.

ORNL DAAC staff member, Ranjeet Devarakonda, presented a poster paper at the Institute of Electrical and Electronics Engineers (IEEE) International Symposium on Collaborative Technologies and Systems (CTS) in Philadelphia, PA, May 22nd-27th.

The Jason Project won the Best Science or Health Curriculum category at the CODiEs for *Operation: Tectonic Fury* to which ORNL staff contributed. Awarded by Software and Information Industry Association, this is a highly competitive and prestigious award for online

educational publishers, game developers and software programmers. The judges for the education categories come from industry, schools, colleges and universities and looked at all of the online content including the text, photos, technical art, games, videos, and teacher resources like tests and classroom handouts of *Tectonic Fury*. This project was suggested by Martin Keller and led by Virginia Dale with expert advice provided by Esther Parish. Amy Johnson and Sam Jackson from the University of Tennessee helped engage the middle school students and teacher in sampling soils under switchgrass in fields near Vonore, Tennessee. The soils were analyzed under the guidance of Deanne Brice and Charles Garten. Mike Hilliard and Alex Sorokine shared model results about the sustainability implications of energy crops via the Everest display. Bobby Whitten showed the students how ORNL's supercomputers are used to expand knowledge. The module *Operation: Tectonic Fury* provides a way for middle school students to use basic science skills to understand how geologic and human forces shape the earth. Because of ORNL's contributions, farming practices and planting of energy crops are included as influences.

Bob Cook presented a guest lecture at the Environmental Information Management Institute of the University of New Mexico, May 23rd.

ORNL staff reviewed manuscripts regarding bioenergy that were submitted to the journals *Environmental Letters*, *Ecological Economics*, and *Biological Conservation*.

Dale Kaiser presented a poster at the American Wind Energy Association's Wind Power 2011 meeting (<http://www.windpowerexpo.org>) in Anaheim, California on May 23rd. The poster explained ORNL's Wind ENergy Data and Information (WENDI) Gateway (windenergy.ornl.gov) and was titled "The Wind ENergy Data and Information (WENDI) Gateway: An online system for discovering, acquiring, and visualizing wind energy-related information and resources." Co-authors included ESD's Giri Palanisamy, Suresh SanthanaVannan, Jerry Pan, and Ranjeet Devarakonda, Energy & Transportation Science Division's (ETSD) Travis Smith and Michael Starke, and Bruce Wilson. Also contributing to WENDI and the poster content were WENDI student interns Lyndy Wibking and Deborah Higdon. The finished poster was designed by Terri Lloyd of Information International Associates in Oak Ridge. This poster and 100+ others may be viewed online at <http://www.meetingproceedings.com/2011/posters/awea/SplitViewer.asp?PID=MTA1Njc4NA>

Bob Andres attended the second international Workshop on the Regional Carbon Cycle Assessment on Land and Oceans in Shepherdstown, West Virginia, from May 23rd- 27th. He was the lead author on one oral presentation entitled "Global Syntheses: Fossil Fuel Emissions."

ORNL also contributed to the revision of the draft "Vision and Action Plan" document for the Global Sustainable Bioenergy Project (GSB) Stage 2.

On May 24th Keith Kline presented "Bioenergy, Land-Use Change and Food Security," underscoring the opportunities for bioenergy to address multiple development goals in a webinar sponsored by the National Biodiesel Board (www.biodieselsustainability.org). Over one hundred people and classrooms registered for the webinar that targeted graduate students and "Next Generation Scientists." The webinar received print and radio coverage.

Chris Lenhardt attended the Alaska Satellite Facility User Working Group (ASF UWG), May 24th – 25th, Washington, DC.

Bob Andres attended the Global Carbon Project Scientific Steering Committee meeting in Shepherdstown, WV, May 28th – 29th.

BESD New Arrivals

Olaf Czarnecki arrived in May to work as a postdoctoral research associate with Jay Chen. Olaf received his Ph.D. degree from Humboldt University Berlin in Germany in 2010. He has extensive research experience and expertise in plant molecular biology, molecular genetics and molecular physiology. Olaf works on the Laboratory Directed Research and Development (LDRD) project entitled "Integrative signaling modules guiding plant's response to environmental stresses," but also participates in research activities in the Plant-Microbe Interfaces Science Focus Area (SFA) and the BioEnergy Science Center. He has extensive research experience and expertise in plant molecular biology, molecular genetics and molecular physiology. He will contribute to the signal transduction work.

Megan Maloney arrived in May to work as a post-Bachelors research associate with Ben Preston. Megan will contribute to the LDRD project titled, "Quantifying Economic Losses Associated with Climate Extremes under Conditions of Climatic Socioeconomic Change."

Silke Nissen arrived in May to work as a postdoctoral research associate with Frank Loeffler. Silke will explore the effects of redox potential on gene expression in bacteria implicated in radionuclide redox transformations.

Fayzul Pasha arrived in May to work as postdoctoral research associate with Bo Hadjerioua. Fayzul will work on three tasks within the ORNL Wind and Water Power Technologies Program: Pumped Storage Resource Assessment, Non-Powered Dam Resource Assessment, and Hydropower Advancement Project.

Maggie Stevens began a 6-month HERE assignment supported by the DOE Office of Biomass Program (OBP) Brazil Project, working with Keith Kline, Debo Oladosu and others to analyze sustainable bioenergy production and land use change. Maggie is a graduating Masters student from University of Tennessee's department of Forestry Wildlife and Fisheries Science and recently returned from Minas Gerais, Brazil, where she examined land use and eucalyptus farming near a reserve in the Atlantic Forest of Brazil.

Yaxing Wei reported to work in May, working as a Geospatial Information Scientist with Chris Lenhardt in ESD's Environmental Data Science & Systems Group.