

B&ESD Newsletter
June 2012

Pubs and Products

Bælum, J., Borglin, S., Fortney, J. L., Lamendela, R., Mason, O. U., Bill, M., Holman, H.-Y., Hazen, T. C., and J. K. Jansson. 2012. Oil degradation potential and microbial community response to oil in the Gulf of Mexico at 1100 m. *Environ. Microbiol.* Available online. DOI: 10.1111/j.1462-2920.2012.02780.x

Boissier, F., Georgescauld, F., Moynié, L., Dupuy, J.-W., Sarger, C., Podar, M., Lascu, I., Giraud, M.-F., and A. Dautant. 2012. An intersubunit disulfide bridge stabilizes the tetrameric nucleoside diphosphate kinase of *Aquifex aeolicus*. *Proteins* 80: 1658-68.

On June 5th Abhijeet Borole was awarded a U.S. Patent (8,192,854) for the new invention, Microbial Fuel Cell Treatment of Ethanol Fermentation Process Water.

Brown, S. D., Palumbo, A. V., Panikov, N., Arlyawansa, T., Klingeman, D. M., Johnson, C. M., Land, M. L., Utturkar, S. M., and S. S. Epstein. 2012. Draft Genome Sequence for *Microbacterium laevaniformans* Strain OR221, a Bacterium Tolerant to Metals, Nitrate, and Low pH. *J. Bacteriol.* 194: 3279-3280.

Campbell, J. H., Foster, C. M., Vishnivetskaya, T., Campbell, A. G., Yang, Z. K., Wymore, A., Palumbo, A. V., Chesler, E. J., and M. Podar. 2012. Host genetic and environmental effects on mouse intestinal microbiota. *ISME J.* Available online. DOI: 10.1038/ismej.2012.54

Chakraborty, R., Wu, C. H., and T. C. Hazen. 2012. Systems biology approach to bioremediation. *Curr. Opin. Biotech.* 23: 483-490.

DeAngelis, K. M., Fortney, J. L., Borglin, S., Silver, W., Simmons, B., and T. C. Hazen. 2012. Anaerobic decomposition of switchgrass by tropical soil-derived feedstock adapted consortia. *mBio* Available online. DOI: 10.1128/mBio.00249-11

On June 12th Elias Greenbaum, Miguel Rodriguez, Jr., Jie Jayne Wu, and Hairong Qi were awarded a U.S. Patent (8,198,075) for their invention, Method and Apparatus for Enhanced Detection of Toxic Agents.

Guss, A. M., Olson, D. G., Caiazza, N. C., and L. R. Lynd. 2012. Dcm methylation is detrimental to plasmid transformation in *Clostridium thermocellum*. *Biotechnol. Biofuel.* 5: 30.

Hazen, T. C. 2012. Genome Alberta and the Public Policy Forum. Enhancing Energy Production and Environmental Outcomes through Genomics: The case for innovation. Genome Alberta and the Public Policy Forum, Canada.

Hazen, T. C. and S. Wuertz. 2012. Environmental Biotechnology: Editorial Overview. *Curr. Opin. Biotech.* 23: 1.

Human Microbiome Project Consortium (including M. Podar and T. Vishnivetskaya). 2012. A framework for human microbiome research. *Nature* 486: 215-21. View full list of contributing

authors at <http://www.nature.com/nature/journal/v486/n7402/full/nature11209.html#/group-1>.

Human Microbiome Project Consortium (including M. Podar and T. Vishnivetskaya). Structure, function and diversity of the healthy human microbiome. *Nature* 486: 207-14. View full list of contributing authors at

http://www.nature.com/nature/journal/v486/n7402/full/nature11234.html?WT.ec_id=NATURE-20120614#/group-1.

Khudyakov, J. I., D'haeseleer, P., Borglin, S. E., DeAngelis, K. M., Woo, H., Lindquist, E. A., Hazen, T. C., Simmons, B. A., and M. P. Thelen. 2012. Global transcriptome response to ionic liquid by a tropical rain forest soil bacterium, *Enterobacter lignolyticus* SCF1. *P. Natl. Acad. Sci. USA* Available online. DOI: 10.1073/pnas.1112750109

Iduri, B. R., Ellis, D. R., Slavov, G. T., Yin, T., Zhang, X., Muchero, W., Tuskan, G. A., and S. P. DiFazio. 2012. Identification of quantitative trait loci and candidate genes for cadmium tolerance in *Populus*. *Tree Physiol.* 00: 1-13.

Kinner, N., et. al. 2012. The Future of Dispersant Use in Spill Response. Workshop Report. Coastal Response Research Center, University of New Hampshire. View full list of contributors and original document at http://www.crrc.unh.edu/workshops/dispersant_future_11/index.html.

Kumar, L., Tooyserkani, Z., Sokhansanj, S., and J. Saddler. 2012. Does densification influence the steam pretreatment and enzymatic hydrolysis of softwoods to sugars? *Bioresource Technol.* Available online. DOI: 10.1016/j.biortech.2012.06.049

Liang, Y., Van Nostrand, J. D., N'Guessan, L., Peacock, A. D., Deng, Y., Long, P. E., Resch, C., Wu, L., He, Z., Li, G., Hazen, T. C., Lovely, D., and J. Zhou. 2012. Microarray-based functional analysis of microbial communities for in-situ uranium reduction under sulfate-reducing vs. Fe-reducing conditions. *Appl. Environ. Microbiol.* 78: 2966-2972.

Martinez, R. J., Bruce, D., Detter, C., Goodwin, L. A., Han, J., Han, C. S., Held, B., Land, M. L., Mikhailova, N., Nolan, M., Pennacchio, L., Pitluck, S., Tapia, R., Woyke, T., and P. A. Sobeckya. 2012. Complete genome sequence of *Rahnella aquatilis* CIP 78.65. *J. Bacteriol.* 194: 3020-3021.

Mason, O. U., Hazen, T. C., Borglin, S., Chain, P. S. G., Dubinsky, E. A., Fortney, J. L., Han, J., Holman, H.-Y., Hultman, J., Lamendella, R., Mackelprang, R., Malfatti, S., Tom, L. M., Tringe, S. G., Woyke, T., Zhou, J., Rubin, E. M., and J. K. Jansson. 2012. Metagenomics, metatranscriptomics and single cell sequencing reveal bacterial response to the Gulf oil spill. *ISME J.* DOI: 10.1038/ismej.2012.59

McFarlane, K. J., Torn, M. S., Hanson, P. J., Porras, R. C., Swanston, C. W., Callahan, M. A., Jr., and T. P. Guilderson. 2012. Comparison of soil organic matter dynamics at five temperate deciduous forests with physical fractionation and radiocarbon measurements. *Biogeochemistry* Available online. DOI: 10.1007/s10533-012-9740-1

McMurtrie, R. E., Iversen, C. M., Dewar, R. C., Medlyn, B. E., Näsholm, T., Pepper, D. A., and R. J. Norby. 2012. Plant root distributions and nitrogen uptake predicted by a hypothesis of optimal root foraging. *Ecol. Evol.* 2: 1235-1250.

- Nag, A., Karpinets, T. V., Chang, C. H., and M. Bar-Peled. 2012. Enhancing a Pathway-Genome Database (PGDB) to capture subcellular localization of metabolites and enzymes: the nucleotide-sugar biosynthetic pathways of *Populus trichocarpa*. *Database* Vol. 2012: Article ID bas013.
- Russell, L. M., Rasch, P. J., Mace, G. M., Jackson, R. B., Shepherd, J., Liss, P., Leinen, M., Schimel, D., Vaughan, N. E., Janetos, A. C., Boyd, P. W., Norby, R. J., Caldeira, K., Merikanto, J., Artaxo, P., Melillo, J., and M. G. Morgan. 2012. Ecosystem impacts of geoengineering: A review for developing a science plan. *Ambio* 41: 350-369.
- Song, C., Xu, X., Sun, X., Tian, H., Sun, L., Miao, Y., Wang, X., and Y. Guo. 2012. Large methane emission upon spring thaw from natural wetlands in the northern permafrost region. *Environ. Res. Lett.* Available online. DOI: 10.1088/1748-9326/7/3/034009
- Sullivan, T. S., Gottel, N. R., Basta, N., Jardine, P. M., and C. W. Schadt. 2012. Firing range soils yield a diverse array of fungal isolates capable of organic acid production and Pb-mineral solubilization. *Appl. Environ. Microbiol.* Available online. DOI: 10.1128/AEM.01091-12
- Tumuluru, J. S., Sokhansanj, S., Lim, C. J., Bi, T., Kuang, X., and S. Melin. 2012. Effect of low and high storage temperatures on headspace gas concentrations and physical properties of wood pellets. *Int. Wood Prod. J.* Available online. DOI: 10.1179/2042645312Y.0000000019
- Tuskan, G. A., DiFazio, S., Faivre-Rampant, P., Gaudet, M., Harfouche, A., Jorge, V., Labbe, J. L., Ranjan, P., Sabatti, M., Slavov, G., Street, N., Tschaplinski, T. J., and T. M. Yin. 2012. The obscure events contributing to the evolution of an incipient sex chromosome in *Populus*: a retrospective working hypothesis. *Tree Genet. Genomes* 8: 559-571.
- Weston, D. J., Pelletier, D. A., Morrell-Falvey, J. L., Tschaplinski, T. J., Jawdy, S. A., Lu, T. Y., Allen, S. M., Karve, A., Melton, S. J., Martin, M. Z., Schadt, C. W., Chen, J. G., Yang, X., Doktycz, M. J., and G. Tuskan. 2012. *Pseudomonas fluorescens* induces strain-dependent and strain-independent host plant responses in defense networks, primary metabolism, photosynthesis and fitness. *Mol. Plant Microbe In.* 25: 765-778.
- Wicklein, H. F., Ollinger, S. V., Martin, M. E., Hollinger, D. Y., Lepine, L. C., Day, M. C., Bartlett, M. K., Richardson, A. D., and R. J. Norby. 2012. Variation in foliar nitrogen and albedo in response to nitrogen fertilization and elevated CO₂. *Oecologia* 169: 915-925.

Notable Achievements

During April and May, Brian Davison and Steve Brown spent 2 days each on different trips to visit and observe at Mascoma and with Lee Lynd's group at Dartmouth College. Brian and Steve were involved in technical discussions on inter-laboratory BioEnergy Science Center (BESC) collaborations.

Mike Ryon and Kitty McCracken attended the Southern Appalachian Man and the Biosphere business meeting on May 3rd, where Mike Ryon presented an informational talk.

Udaya Kalluri was invited to attend the Department of Energy (DOE) Joint Genome Institute (JGI) Strategic Planning Workshop held during May 30th-June 1st. The workshop was

devoted to exploring the evolution and future directions for DOE JGI, the only high-throughput deoxyribonucleic acid (DNA) sequencing center that addresses missions beyond biomedical ones.

During June 1st-29th Keith Kline and Maggie Davis participated in nine International Organization for Standardization (ISO) PC248 webinars associated with six expert task groups and submitted six proposals for text as the various Work Groups continue to negotiate language for the next draft Standard. ORNL also contributed to the first WG-4 meeting under a new mandate and work plan for the June-December, 2012, period.

Bob Cottingham, Tom Brettin, and Anthony Palumbo participated in the Biodetection Technologies 2012 Conference on June 2nd. Anthony Palumbo presented the talk, “Computational Methods for Biosurveillance.”

The Oak Ridge National Environmental Research Park sponsored a nature walk on June 3rd at the Solway Bend ponds located on the east end of the Oak Ridge Reservation (ORR). John Byrd of the Clinch River Environmental Studies Organization (CRESO) and Trent Jett lead the walk, which included 32 people from local communities who came out to learn about local turtle and snake populations on the ORR.

Tom Wilbanks received a letter of thanks from John Holdren, the Assistant to the President for Science and Technology for Barack Obama, for his “excellent work on the technical input document for the *Urban, Infrastructure, Vulnerabilities* chapter of 2013 National Climate Assessment (NCA) report.”

During June 3rd-5th Jerry Parks, Loukas Petridis and Jeremy Smith co-organized a symposium attended by about 90 people at the University of Tennessee (UT) Conference Center, Knoxville, entitled: "From Computational Biophysics to Systems Biology."

Terry Hazen gave an invited presentation, “Fate and distribution of Deepwater Horizon oil” at the Gordon Research Conference on Oceans and Human Health, June 3rd-8th in Biddeford, ME.

On June 4th Shahab Sokhansanj met with Greg Cabe of Enviva by phone to discuss storage and handling of pellets. Enviva is one of the largest producers of pellets in the U.S., with more than 5 plants in the U.S. and a number of plants in Europe and elsewhere. The conversation with Greg explored temperature rise and decay cycles that Enviva experiences in pellet storage domes. Temperature rise will happen immediately after transferring pellets from pellet mill (after cooling) to the dome. These temperature rises can be excessive causing burnout and blackening of pellets.

During June 4th-5th Shahab Sokhansanj participated in the National Sciences and Engineering Research Council (NSERC) Bioconversion Network Pretreatment Workshop in Vancouver, British Columbia, Canada. The workshop featured presentations/tutorials, and interactive discussions from experts in biomass pretreatment technologies, pretreatment equipment manufacturers, pulp and paper companies and end users. Notably Brian Davison made a presentation on instrumental techniques for identifying recalcitrant in bioconversion systems. Other presenters were Bruce Dale (Michigan state University), Guido Zachhi (Lund University), Quang Nguyen (Abengoa), Jerry Gargulak Borregard, Mike Rushton (Lignol), Bertil Stromberg (Andritz), Chris Kajzer (Metso), and Hui Xu (NovoZymes). Kevin Kenney of Idaho National Laboratory (INL) and Shahab Sokhansanj made presentations on feedstock logistics and participated in a panel discussion on biomass logistics and handling. Other members of the panel

were Geoff Clarke of Alberta Pacific Forest Industries, Mark Ryan of FPIInnovations, and Luyi Ma of Beijing Forest Engineering University.

Rich Norby served on the steering committee for a DOE workshop on "Critical Research Needs in Tropical Ecology," held June 4th-6th in Bethesda, MD. Peter Thornton and Forrest Hoffman also participated in the workshop, and a subsurface science group, led by Melanie Mayes, submitted a white paper for consideration. Rich and Peter are on the writing team for the workshop report, which will provide guidance for a Next Generation Ecosystem Experiments (NGEE)-Tropics program.

On June 5th Keith Kline submitted comments on plans for a Global Bioenergy Partnership (GBEP) Workshop tentatively scheduled for Africa in the first quarter FY13.

Jonathan Mielenz presented BioEnergy Science Center (BESC) results at the Eighth International Conference on Renewable Resources and Biorefinery (RRB8) in Toulouse, France, on June 5th. Jonathan is a member of their advisory committee. The title of his talk was "Synergistic Impact of Consolidated Bioprocessing Microorganisms and Natural or Variant Feedstocks." Switchgrass is of high interest to European countries as are willow and miscanthus. The approximately 250 attendees originated largely from European countries, with only a handful of U.S. attendees.

Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) Scientist, Bob Cook, attended the Data Curation Education in Research Centers (DCERC) Workshop held in Boulder, CO, during June 5th-7th. Learn more at <http://cirss.lis.illinois.edu/DCERC/DCERC.html>.

Glenn Cada was invited to co-organize and chair special sessions at the 2nd National Conference on Engineering & Ecohydrology for Fish Passage in Amherst, MA, during June 5th-7th.

Virginia Dale gave a presentation on "Lessons from 32 years of Ecological Recovery at Mount St. Helens" at the Princeton Plasma Physics Laboratory Colloquium on Wednesday, June 6th. The symposium fostered a lively debate about science, performing experiments to test models, and scaling issues.

On June 6th Shahab Sokhansanj met with Mark Ryan of FPIInnovations. Mark is the Manager of Bioenergy Research and Development. The discussion concerned access to a number of computer programs that FPIInnovations have developed. These programs are various modules in FPSuite. The Biomass Opportunity and Supply (BiOS) module in FPInterface is a tool for spatially evaluating available volumes and recovery costs of forest-origin biomass from a provided timber harvest area. Mark has agreed that under an educational arrangement, some graduate students at the University of British Columbia (UBC) can have access to this program.

On June 6th Jim Keiser along with Sandy Sharp (CorrosionControl and materials Engineering, Columbia, MD) visited the UBC Clean Energy Research Center. Cliff Mui (Nexterra), Doug Singbeli of FPIInnovations, and Shahab Sokhansanj participated in this visit. The purpose of the visit was to review the location of sampling points within the Nexterra Gasification system and opportunities to take samples (fuel and gas). Cliff outlined the structure of the system. The discussion followed by site visit to the Combined Heat and Power (CHP) plant. The team followed the flow of biomass and gas in the system and identified critical points for sampling and measurements.

On June 7th Laurence Eaton, Esther Parish and Suresh SanthanaVannan met with UT colleagues to discuss the ongoing construction of an online Biomass Atlas for the Southeast region, as funded through the Sun Grant Initiative.

On June 7th Debo Oladosu stood in for Tim Theiss at the Advanced Biofuels and the Midwest Market in Chicago, IL. Participants highlighted the challenges facing the advanced biofuels industry, as well as many encouraging developments. Many participants agreed on the need to preserve the Renewable Fuel Standard (RFS2), with safeguards that continue to address economic, environmental and social issues. In particular, a continuation of the advanced biofuel tax credit is seen as crucial to the advanced biofuels industry.

On June 7th and 8th staff met with Molly Jahn (University of Wisconsin) to discuss strategic planning for testing bioenergy indicators in pilot projects across diverse landscapes.

Also during June 7th-8th ORNL hosted visitors from the Colombia Petroleum Company (EcoPetrol, Instituto Colombiano del Petróleo), Ariel Uribe Rodriguez and Edgar Fernando Castillo Monroy, and exchanged ideas for collaborative research on indicators of sustainable bioenergy systems, shared information on the Latin America Caribbean and Africa (LACAF) project, and other topics of mutual interest.

Kitty McCracken attended the June 8th Tennessee Exotic Plant Pest Council (TNEPPC) board meeting to discuss setting up an Oak Ridge public workshop on exotic pest plants and their control.

On June 8th staff met with Henry Neufeldt of Global Climate Change and Food Security (GCAFS) and the World Agroforestry Center in Nairobi, Kenya.

During June 10th-13th Matt Langholtz and Laurence Eaton presented a poster titled “Integrating Microalgae Biofuel Production Potential into Biomass Resource Assessment” at the 2nd International Conference on Algal Biomass, Biofuels and Bioproducts in San Diego, CA.

Bob Andres attended the 2012 Atmospheric Composition Change the European Network (ACCENT)-International Global Atmospheric Chemistry (IGAC)-Global Emissions Initiative (GEIA) Conference in Toulouse, France, from June 11th-13th. He presented the poster, “A new estimate of uncertainty associated with global carbon dioxide emissions from fossil fuel consumption” and was a coauthor on the poster, “A monthly high-resolution fossil fuel CO₂ emission inventory for recent years, 2000-2010.”

ORNL DAAC Research Staff, Suresh K. SanthanaVannan, and ORNL DAAC Project Manager, Sue Heinz, attended the Knowledge Systems for Sustainable Management of Working Landscapes (KSS) workshop in Washington, DC, during June 11th-13th.

ORNL DAAC Scientist, Bob Cook, attended the Science Planning meeting for the National Aeronautics and Space Administration (NASA) upcoming Arctic Boreal Vulnerability Experiment (ABOVE) Field Campaign, June 13th-15th, in Boulder, CO. Learn more at http://cce.nasa.gov/terrestrial_ecology/scoping.html#above.

Thomson Reuters notified the ORNL DAAC that ORNL DAAC data products will be a part of the Data Citation Index that Thomson Reuters will release in Fall 2012. Additional information on this new service is available. See the Reuters article, “Thomson Reuters Unveils Data Citation Index for Discovering Global Data Sets,” online at

<http://www.reuters.com/article/2012/06/22/idUS109861+22-Jun-2012+HUG20120622>.

On Thursday, June 14th Mark Downing discussed "Sustainability Considerations for the Biomass Plant Feedstock Supply" at an event co-sponsored by Tennessee Citizens for Wilderness Planning and Advocates for the Oak Ridge Reservation (AFORR), and held at the Midtown Community Center in Oak Ridge. The American Society of Mechanical Engineers provided refreshments.

ORNL DAAC Manager, Chris Lenhardt, participated in the monthly Earth Science Information Partners (ESIP) Federation ExCom telecon on June 14th in his capacity as interim chair of the ESIP Constitution and Bylaws Committee.

On June 16th Jeremy Smith presented the Departmental Colloquium of the Department of Chemistry at Cambridge University, United Kingdom, with a lecture on molecular aspects of energy and the environment.

Terry Hazen contributed to the following posters at the Annual Meeting of the American Society for Microbiology, June 16th-19th in San Francisco, CA:

- Zhou, A., Z. He, E. Baidoo, K. Hillesland, M. P. Joachimiak, J. K. Baumoh, P. Benke, A. Mukhopadhyay, G. M. Zane, P. S. Deha, J. D. Wall, A. P. Arkin, D. Stahl, T. C. Hazen, and J. Zhou. Contributed. Molecular basis to adaption to salt in *Desulfovibrio vulgaris* in an evolutionary context.
- Dubinsky, E. A., L. Tom, F. Reid, S. Borglin, K. Chavarria, J. Fortney, D. Joyner, J. Kuehl, R. Lamendella, H. Lim, O. Mason, Y. Piceno, K. Wetmore, C. Wu, T. C. Hazen, and G. Andersen. Contributed. Succession and persistence of hydrocarbon-degrading microbial communities following the Deepwater Horizon Oil Spill.
- Chakraborty, R., Y. M. Piceno, F. C. Reid, S. E. Borglin, E. A. Dubinsky, L. M. Tom, T. C. Hazen, and G. L. Andersen. Contributed. Microbial Community Structure and Hydrocarbon Degradation by Isolates Obtained from Different Depths in the Aftermath of the Deepwater Horizon Spill in the Gulf of Mexico.
- Yilmaz, S., P. Liu, R. J. Meagher, Y. K. Light, A. P. Arkin, T. C. Hazen, and A. K. Singh. Contributed. Single-cell Analysis Platforms for Genomic Analysis of Uncultivable Environmental Microbes.
- Lee, S., D. Tarjan, J. T. Geller, M. E. Singer, C. Wu, T. Torok, T. C. Hazen, N. J. Hillson, and A. P. Arkin. Contributed. Assessing and Mitigating the Biological Risks of Genetically Modified Bacteria in the Environment.
- Walian, P., S. Allen, M. Shatsky, L. Zeng, E. Szakal, H. Liu, B. Lam, J. Geller, K. Hillesland, S. Hall, S. Fisher, M. Fields, D. Stahl, T. C. Hazen, S. Brenner, J-M. Chandonia, E. Witkowska, M. Biggin, and B. Jap. Contributed. Membrane Protein Complexes of *Desulfovibrio vulgaris*- Changes in Response to Stress and the Establishment of Communities.
- Butland, G. P., S. R. Chhabra, B. Gold, N. L. Liu, S. Reveco, T. R. Juba, J. D. Wall, B. R. Lam, J. T. Geller, T. C. Hazen, M. Choi, M. D. Biggin, E. D. Szakal, S. Allen, H. Liu, H. E. Witkowska, and J-M. Chandonia. Contributed. High Throughput Identification of Protein Complexes from *Desulfovibrio vulgaris* by a Tandem Affinity Purification Pipeline.
- Baidoo, E. E., S. Yilmaz, J. Geller, T. C. Hazen, A. K. Singh, and J. D. Keasling. Contributed. Differential Analysis of Metabolic Intermediates from *Desulfovibrio vulgaris* Hildenborough and *Methanococcus maripaludis* under Syntrophic Growth Conditions.
- Meyer, B., J. Kuehl, A. Deutschbauer, M. Price, A. Arkin, T. C. Hazen, and D. Stahl.

Contributed. Alternative Electron Transfer Systems in Desulfovibrio-Methanogen Assemblies: Case Study of Desulfovibrio alaskensis str. G20-Methanogen Cocultures Grown on Lactate.

- Hemme, C. L., Y. Deng, T. J. Gentry, M. W. Fields, L. Wu, S. Green-Tringe, D. B. Watson, Z. He, P. Chain, T. C. Hazen, J. M. Tiedje, E. M. Rubin, and J. Zhou. Contributed. Metagenomic Insights into Evolution of a Heavy Metal-Contaminated Groundwater Microbial Community.
- Zhang, P., W-M. Wu, J. Van Nostrand, Y. Deng, Z. He, D. Curtis, T. Gihring, G. Zhang, C. Schadt, D. Watson, P. Jardine, C. Criddle, S. Brooks, T. Marsh, J. Tiedje, T. C. Hazen, and J. Zhou. Contributed. Dynamic Changes of Microbial Communities in Response to Stimulation with Emulsified Vegetable Oil for U(VI) Reduction at a Contaminated Aquifer.
- Moberly, J. G., T. J. Phelps, M. Podar, S. D. Brown, Z. K. Yang, M. M. Drake, T. C. Hazen, A. P. Arkin, A. V. Palumbo, and D. A. Elias. Contributed. Development of a Model Microbial Community for a Systems Biology Level Assessment of Metal-reduction.
- Mosher, J. J., T. J. Phelps, M. Podar, S. D. Brown, T. C. Hazen, A. P. Arkin, A. V. Palumbo, B. A. Faybishenko, and D. A. Elias. Contributed. Determination of the Influence of Chromium on Microbial Community Structure and Function.
- Lamendella, R., S. E. Borglin, R. Chakraborty, T. C. Hazen, and J. K. Jansson. Contributed. Metatranscriptomics of an oil contaminated beach following the Deepwater Horizon Oil Spill.
- Podar, M., J. J. Mosher, S. D. Brown, D. C. Joyner, R. Csencsits, T. J. Phelps, K. H. Downing, T. C. Hazen, A. P. Arkin, A. V. Palumbo, and D. A. Elias. Contributed. A Functional Genomic Characterization of Metal-reducing *Pelosinus* spp. isolated from Cr(VI) Contaminated Groundwater.

Mark Bevelhimer, Ryan McManamay, Jim Parham, Shelaine Hetrick and Brennan Smith hosted a meeting in Washington, DC, June 17th-19th, which provided an overview of current attribution information applied to National Hydropower Asset Assessment Program (NHAAP)- National New Site Development (NSD) locations, indication of known missing information due to resource constraints, results from the NSD environmental attribution within the Alabama-Coosa-Tallapoosa (ACT) and Apalachicola-Chattahoochee-Flint (ACF) and Upper/Lower Colorado basins and a forum for discussion.

On June 18th ORNL DAAC Manager, Chris Lenhardt, led a telecon of the Earth Science Information Partners (ESIP) Federation Constitution and Bylaws Committee in his capacity as interim Chair.

Shahab Sokhansanj attended the 20th European Biomass Conference and Exhibition (EU BC&E) in Milan, Italy, June 18th-22nd. The Conference is supported by the European Commission, the United Nations Educational Scientific and Cultural Organization (UNESCO) - Natural Sciences Sector, World Council for Renewable Energy, the European Biomass Industry Association. More than 850 attended the conference. The EU aims to get 20% of its energy from renewable sources by 2020. At the conference, Shahab gave the oral presentation, "Torrefaction in North America."

Robert Cook, ORNL DAAC Scientist, gave a Web Video lecture on Monday, June 18th, at the Australian National Data Service on the practice of use of data citations, digital object identifiers, and metrics of data product citations.

ORNL DAAC Research Staff, Yaxing Wei, attended the DataONE Provenance Working Group (ProvWG) meeting held at Santa Barbara, CA, on June 18th and 19th to discuss the draft

DataONE-Open Provenance Model (D-OPM), present the workflows involved in DataONE Exploration, Visualization, and Analysis (EVA) and the Multi-Scale Synthesis and Terrestrial Model Intercomparison Project (MsTMIP) as potential use scenarios to test D-OPM, and discuss how the DataONE ProvWG work in return can help climate science community to better address lineage, re-productivity, and long-term preservation of data/computing resources.

ORNL DAAC staff held a telecon on June 19th with Land Processes DAAC (LPDAAC) staff to discuss the upcoming visit to ORNL to discussion ORNL/LPDAAC collaboration.

On the invitation from Jaap Koppejan, the Administrator of IEA Task 32, Shahab Sokhansanj attended a half day of the IEA Task 32 Biomass Combustion and Co-firing meeting in Milan. This meeting was held on June 19th as a parallel event to the EU BC&E conference. Task 32 focuses on feedstock characteristics as related to combustion properties including gasification and pyrolysis. The Task also works on preparation of biomass feedstock and on reduction of aerosols from biomass combustion systems. The particular discussion during this meeting was on preparation of a manual for engineering design and safe practices for handling biomass. Other topics of discussion were recent developments in torrefaction and pelletization technologies and compositional characteristics of feedstock that cause early corrosion in fireboxes and combustion chambers. Recent developments in small scale pyrolysis for drop in fuels and combined heat and power for distributed systems were also discussed. In addition to most European participation, Japan, Brazil, and South Korea are becoming members of this task. The U.S. is not a member, and Canada has recently withdrawn its membership due to Federal austerity measures.

ORNL DAAC Research Staff, Yaxing Wei attended the 4th International Provenance and Annotation Workshop (IPAW 2012), held at the University of California at Santa Barbara, CA, on June 19th, 20th, and 21st, to learn the most recent progresses in provenance research, the new W3C PROV provenance standard, and how the climate change community can benefit from these activities.

Abhijeet Borole received an “Excellence in Review Award” from the journal, *Environmental Science & Technology*, in June 2012.

On June 20th Virginia Dale gave a presentation on “Indicators to support assessment of sustainability assessment of energy systems” to more than 200 students who are interns at ORNL under the Oak Ridge Associated University summer program.

On June 20th Keith Kline presented “Sustainability, Certification and Opportunities to Level the Playing Field” as an invited speaker/panelist at the BIO 2012 International Convention in Boston, MA (<http://convention.bio.org/>). Keith discussed standards and certification issues with panelists Ian Thompson of Canada’s Waterfall Group (bioenergy consulting), Richard Nelson (representing National Biodiesel Board) and Peter Ryus, CEO for the Roundtable on Sustainable Biofuels (RSB) Services Foundation during the Session on “Sustainability-GHG Certification Schemes, Key Industry Actions Towards a Level Playing Field.”

Brennan Smith and Qinfen (Katherine) Zhang attended the Hydropower Advancement Project (HAP) workshop in Chattanooga, TN, during June 20th-22nd, for condition rating calibration at the time point when five out of ten baseline assessments had been completed to date. On the first day, the attendees included Subject Matter Experts (SMEs) from Mesa Associates (Subcontractor for HAP condition assessment), Brennan Smith and Qinfen (Katherine) Zhang, as well as Rajesh Dham and Michael Spray from DOE headquarters. The varying experiences in work with facility

owners for arranging visits, collecting data, availability of data, performing assessments, and getting feedback were discussed. The condition assessment process and methodology were briefly reviewed, emphasizing that the 10 baseline assessments were designed for verifying and refining the assessment process and methodology. Based on the recognized minor issues for condition rating consistency across projects and the review comments from facility owners and external methodology reviewers, refining the condition rating process and methodology in Revision 2 documents, and applying the refined process to the remaining baseline assessments and future nationwide assessments were discussed. In terms of best practices and methodology document revision, this workshop also served as a kickoff meeting for Revision 2 work. On the second day (morning only), the project management team from subcontractors, ORNL and headquarters discussed the cost per facility assessment, and the syllabus for DOE HAP training workshops that will be provided to the awardee teams to ensure the consistency across different assessment teams for 40-50 facilities nationwide using standardized assessment methodology.

On June 21st Virginia Dale, Latha Baskaran, and Esther Parish met with colleagues from UT on ways to validate water quality models and to collaborate on assessment of energy sustainability.

Jonathan Mielenz presented BESC research (Synergistic Impact of Consolidated Bioprocessing Microorganisms and Natural or Variant Feedstocks) at the 20th European Biomass Conference and Exhibition in Milan, Italy, on June 21st. The approximately 1050 attendees included about 125 exhibitors. There were 28 U.S. attendees and nearly no overlap with the RRB8 meeting (June 5th) attendees. Interestingly Jonathan's talk was immediately preceded by a talk by Venkatesh Balan from the Great Lakes Bioenergy Research Center, one of the other U.S. DOE-funded Bioenergy Research Centers.

Shahab Sokhansanj participated in the half day workshop organized by SECTOR (Production of Solid Sustainable Energy Carriers from Biomass by Means of Torrefaction) on June 21st. SECTOR is a large-scale consortium of 21 partners from industry and science – mostly in Europe. The project is focused on the further development of torrefaction-based technologies for the production of solid bioenergy carriers and on supporting the commercial torrefaction-based bioenergy as a commodity renewable solid fuel. The topics of discussion in this meeting reviewed torrefaction research and development within SECTOR, Torrefaction developments by Energy Center The Netherlands (ECN), Topell torrefaction technology, Biomass densification concepts, and Andritz developments in torrefaction. Shahab Sokhansanj made the invited presentation on the Status of Torrefaction in North America.

Robert Grisso (Professor of Biological Systems Engineering at Virginia Tech) completed a sabbatical at ORNL, working with Erin Webb and Shahab Sokhansanj. While at ORNL, Robert worked on improved models on the impacts of high-yielding energy crops on harvest machinery performance and developed a methodology for using weather data to determine the number of days suitable for biomass harvesting.

During June 24th-26th Esther Parish conducted geographic information system (GIS) analysis to provide UT colleagues with additional potential water sampling locations for sustainability analysis of switchgrass production under the Southeast Partnership for Integrated Biomass Supply Systems (IBSS) project funded by the United States Department of Agriculture (USDA).

Mercury Science Focus Area (SFA) staff and staff in Earth and Aquatic sciences organized three sessions at the Goldschmidt Geochemical conferences, June 24th-29th, in Montreal, Canada. Feng He and Eric Pierce with two external scientists organized Session 21b: Soil and Sediment Remediation. Dwayne Elias with two external scientists organized Session 14d: Geochemical

Influences on Hg Bioavailability and Biogeochemical Transformations. M.-D. Cheng with three external scientists organized Session 11f: Transport and Transformation of Natural (Volcanic) and Anthropogenic (black carbon) Aerosols. Liyuan Liang and Eric Pierce presented invited two talks. M.-D. Cheng, Scott Brooks, Dave Watson, Eric Pierce, Baohua Gu, Alex Johs, and Dwayne Elias participated and presented multiple oral or poster presentations.

The journal *WIREs Nanomedicine and Nanobiotechnology* has released their list of top ten cited journal articles. The article, “Atomic force microscopy of biological samples,” co-authors including David Allison, Ninell Mortensen, and Mitch Doktycz, appears on the list. Read the original article at <http://onlinelibrary.wiley.com/doi/10.1002/wnan.104/full>.

On June 25th several ORNL staff completed the survey of the International Energy Agency (IEA) Bioenergy on sustainability certification of biomass, biofuels, and bioenergy.

Latha Baskaran and Phil Nugent collaborated to provide spatial data depicting numbers of fish and mussel species with elevated conservation concern in the ORNL Knowledge Discovery Framework, with appropriate attribution. This data can be overlaid with previously provided layers showing areas of high potential switchgrass yield to assess geographic potential for maintaining or improving aquatic biodiversity.

Katherine Zhang and Bo Saulsbury attended the Basin Scale Hydropower Opportunity Assessment Logistics Committee Meeting, June 25th-28th, held by Pacific Northwest National Laboratory (PNNL) in Bend, OR. During the meeting ORNL presented and discussed the approach for hydro opportunities analysis. ORNL is leading this effort. On June 27th they met with several shareholders of Deschutes Water Basin to get more detailed information about the identified hydropower sites. Katherine presented on “Technical and Economic Feasibility Assessment of Small Hydropower Development in the Deschutes River Bank.”

On June 26th Virginia Dale gave a presentation on “Indicators to support assessment of environmental and socioeconomic sustainability of bioenergy systems” to scientists from the University of Arizona who are interested in collaboration opportunities. Attendees included Eric Betterton (Department Head, Atmospheric Science), Kim Ogden (Professor, Chemical and Environmental Engineering) and Ardeth Barnhart (Director Renewable Energy, Institute of the Environment).

Rich Stouder (Global Security Directorate) and Bob Cottingham organized the Oak Ridge Biosurveillance Symposium that was held in conjunction with the annual Biodetection Technologies 2012 Conference in Washington, on June 26th. Bob Cottingham gave the talk, “Introduction to the Biosurveillance Initiative.”

During June 26th-29th ORNL DAAC Manager, Chris Lenhardt, attended the National Oceanic and Atmospheric Administration (NOAA) Data Access and Archiving Requirements Working Group (DAARWG) meeting in Silver Spring, MD.

Chief Scientist Bob Cook, Metadata Coordinator Les Hook, and Deputy ORNL DAAC Manager Tammy Beaty participated in a Terrestrial Ecology telecon with colleagues from the Goddard Space Flight Center (GSFC) on June 27th.

During June 27th-29th ORNL DAAC Research Staff, Suresh K. SanthanaVannan attended the EUROSPEC Joint Meeting (International Networks Cooperating to Link Spectral Data and Flux Measurements Around the World) in Madrid, Spain.

Members of the ORNL DAAC leadership team held a telecon with Land Processes (LP) DAAC management in preparation for their visit in July to discuss data subsetting tool collaboration.

On June 29th Esther Parish and Beau Wesh assisted UT colleagues on a field day around the Vonore switchgrass fields. They helped to collect water quality and quantity data from several farms and nearby channels and investigated a potential new water sampling location for the IBSS project.

Vincent Neary served on doctoral candidate Patrick McMahon's dissertation committee. The dissertation proposal is titled, "Evaluation of Uncertainty in Bedload Transport Estimates in a Southern Appalachian Watershed: Support for Stream Restoration Practice," and will be defended 14 July 14th, 2012.

BESD New Arrivals

Kathryn Bailey arrived in June to work as a postdoctoral research associate with Dwayne Elias. Kathryn's work will include the application, utilization, and development of novel methods toward understanding the interactions and intercellular communication between subsurface bacteria and metals (including heavy metals and radionuclides), the biotransformation of these metals, the resultant biogeochemistry, and the subsequent effects on the microbial community. Existing techniques will include controlled cultivation, analysis of methylated and non-methylated approaches for microbial species and community analysis.

Robert Blackwell is a Higher Education Research Experiences (HERE) Graduate student with Bo Hadjerioua. Robert is working primarily on the new site development project for the ORNL Wind and Water Power Technologies Program.

Sabornie Chatterjee arrived in June to work as a postdoctoral research associate with Alex Johs. Sabornie will work on research projects investigating the chemical modification of lignin as a cost-effective and green precursor for advanced energy storage materials and molecular characterization of biopolymer-metal interactions.

Chun Ju Chen arrived in June to work as a postdoctoral research associate with Xiaohan Yang. Chun Ju's work will include discovery and functional characterization of small proteins mediating plant-microbe interactions such as selection of candidate genes based on transcriptomics and proteomics data, characterization of candidate genes at the molecular and biochemical levels.

Jitendra Kumar reported to work in June, working in the Ecosystem Science group with Mac Post.

Hui Lin arrived in June to work as a postdoctoral research associate with Baohua Gu. Hui will work on biogeochemical mechanisms of mercury species transformation and soil organic matter/carbon in the environment.

Uchenna Ndosorouwa is a Community College Intern (CCI) working with Vince Neary. He will be developing MATLAB algorithms for comparing hydrodynamic load and energy characteristics at marine and hydrokinetic (MHK) sites using different field velocimeter and turbulence measurement techniques.

Evan Robinson is a HERE student with Brennan Smith. He will help with analysis of siting issues (geology) for new hydropower development studies. He will also be learning some GIS skills.

Nicole Samu arrived in June to work as a post-Masters research associate with Brennan Smith. Nicole will be working on geospatial research for water power resource analysis associated with the DOE Water Power New Site Development and other projects.

Svetlana Stekovich is a SULI student with Vince Neary. She will be developing and validating advanced computational fluid dynamics (CFD) models for marine and hydrokinetic (MHK) technology applications.

Chia-Wei Wu arrived in June to work as postdoctoral research associate with Steve Brown. Chia-Wei will apply, utilize and develop novel methods toward understanding the interactions and intercellular communication between subsurface bacteria and metals (including heavy metals and radionuclides), the biotransformation of these metals, the resultant biogeochemistry, and the subsequent effects on the microbial community.

Weihua Zhang is an associate professor from School of Environmental Science and Engineering, Sun Yat-sen University, in Guangzhou, China. She is on a one-year sabbatical and will be working with Baohua Gu on geochemical transformation of mercury in the environment.