B&ESD Newsletter
December 2011

Pubs and Products

On December 13th William H. Andrews, Jr., Cyril V. Thompson, Arpad A. Vass, and Rob R. Smith were awarded a U.S. Patent (8,074,490) for the new apparatus and method, Clandestine Grave Detector.

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Notable Achievements

During November 29th-December 1st Terry Hazen attended an invited workshop, the National Oceanic and Atmospheric Administration (NOAA) Marine Microbes Workshop, held in Charleston, SC.

On December 1st Keith Kline gave a talk on "Bioenergy and Issues of Sustainability" to the Environmental Protection Office (EPO) at Oak Ridge National Laboratory (ORNL).

Also on December 1st Shahab Sokhansanj presented a lecture on feedstock logistics modeling at the University of Illinois Urbana-Champaign. The presentation was at the invitation of the

Feedstock Engineering Team (Dr. K. C. Ting) of the Energy Biosciences Institute (EBI). The EBI is supported by a $500-million, 10-year award from British Petroleum (BP). It is a collaboration between four research partners: the University of California, Berkeley; the Lawrence Berkeley National Laboratory; the University of Illinois at Urbana-Champaign; and BP. The Institute has five research themes: feedstock development, biomass depolymerization, biofuels production, fossil fuel bioprocessing, and environmental, social and economic dimensions. The feedstock engineering team focuses on engineering solutions for successful production of biomass feedstock. This program objective is being accomplished through five interrelated tasks of (1) pre-harvest crop production, (2) harvesting, (3) transport, (4) storage, and (5) systems informatics and analysis. During this daylong visit, Shahab visited the experimental farm and Agricultural and Biological Engineering laboratories where research on harvest and post harvest processing of miscanthus and switchgrass are underway.

During December 4th-9th Natalie Griffiths attended the Berkeley Catchment Science Symposium and the American Geophysical Union (AGU) fall meeting in San Francisco, CA. At AGU Natalie presented a poster co-authored by Pat Mulholland titled “Seasonal variability in nitrate and phosphate uptake kinetics in a forested headwater stream using pulse nutrient additions,” based on work conducted in Walker Branch.

Terry Hazen, along with coauthors C. L. Spier, W. T. Stringfellow, E. Sonnenthal, and M. Conrad, contributed the abstract, “The distribution of hydrocarbons in surface and deepwater plumes during the MC252 oil spill in the Gulf of Mexico,” to the December AGU meeting in San Francisco, CA.

ORNL Distributed Active Archive Center (DAAC) scientist, Bob Cook, gave two talks in the Data Management 101 for the Earth Scientist AGU Workshop. Carol Meyer and Ruth Duerr organized the workshop. Geographic Information System (GIS) Developer, Yaxing Wei, also attended the 2011 AGU Fall Meeting at San Francisco, CA. He presented a poster titled "Preservation of Earth Science Data History with Digital Content Repository Technology" and a demo titled "Spatial Data Access Tool: On-demand Geospatial Visualization and Download" at the National Aeronautics and Space Administration (NASA) Booth. Other DAAC staff also participated in AGU.

During December 5th-9th Virginia Dale gave a presentation on the “Land use, energy and climate change nexus” at the AGU Fall meeting in San Francisco, CA.

Terry Hazen, along with coauthors B. Faybishenko, H. R. Beller, E. Brodie, E. L. Sonnenthal, C. I. Steefel, J. Larsen, M. E. Conrad, J. N. Christensen, S. T. Brown, D. C. Joyner. S. E. Borglin, J. Geller, R. Chakraborty, P. Nico, P. Long, D. Newcomer, and E. Armtzen contributed the abstract, “Comparison of field groundwater biostimulation experiments using polylactate and lactate solutions at the Chromium-contaminated Hanford 100-H Site,” to the December AGU meeting in San Francisco, CA.

Vince Neary, Abdoul Oubeidillah, and Budi Gunawan also attended the AGU Fall Meeting 2011 in San Francisco, CA. This is a key conference that partner Department of Energy (DOE) labs and industry in marine and hydrokinetic (MHK) technologies and conventional hydropower attend. Vince Neary co-chaired the Marine and Renewable Energy track with Scott James and Jesse Roberts of Sandia National Lab. Vince Neary presented “River Inflow Characteristics for Hydrokinetic Energy Conversion” and Budi Gunawan presented “Accuracy of Spatial and Temporal Averaging of Acoustic Doppler Current Profiler (ADCP) Moving Boat Measurements.” Abdoul Oubeidillah gave an oral presentation on hydro-climatology entitled

"Upper Colorado River and Great Basin Streamflow and Snowpack Forecasting using Pacific Oceanic-Atmospheric Variability." Yetta Jager attended and presented DOE Waterpower research at the AGU Davis Water Management Workshop on December 7th-9th. The team will participate in disseminating information about the DOE Water Program and ORNL Water Power Technologies research through involvement in discussion groups and networking.

On December 5th Shahab Sokhansanj participated in the Clean Energy Research Center (CERC) open house at UBC. CERC is primarily involved researchers from the Departments of Chemical and Biological Engineering and Mechanical Engineering, with some participation also from Materials Engineering and Electrical and Computing Engineering. Currently there are over 60 faculty members and 200 graduate students participating actively in CERC activities. CERC provides state-of-the-art research facilities in a recently completed building for the investigation of clean energy problems and promotes excellent research by means of collaborative research projects, seminars, shared equipment, courses and other means. During the open house Shahab presented his current research on biomass engineering densification, torrefaction and logistics modeling.

On December 6th Mark Peterson gave the "State of the Creek Address" at a public meeting in Oak Ridge. The presentation focused on the latest results of the Environmental Science Division's (ESD) Biological Monitoring and Abatement Program (BMAP) for East Fork Poplar Creek. The address was well attended and received significant news coverage, with the major findings from the presentation reported in local newspapers, websites, TV, and radio broadcasts. A clear message is that the Oak Ridge creek's ecology continues to improve, although significant challenges, especially related to mercury, remain.

Jonathan Mielenz was an invited speaker at the Biomass Technology Research Center (BTRC) in the National Institute of Advanced Industrial Science and Technology (AIST) in Hiroshima, Japan, on December 8th. The title of his presentation was "Better bugs meets better biomass: Potential synergies of superior bioconversion microorganisms and improved biomass sources." Attendees included two visiting collaborators from Brazil in addition to the Institute and local Hiroshima University scientists. The visit also included attendance at a renewable energy exposition in Tokyo earlier that week. Collaboration with AIST has included the visit by a BTRC AIST postdoctoral fellow to Mielenz's Group for five months ending in January.

On December 9th the finished genome of *Desulfovibrio desulfuricans* ND132, the model organism for Mercury methylation used by the Mercury Science Focus Area (SFA), was circularized, annotated, and deposited into GenBank [CP003220]. Likewise the genome of *Desulfovibrio africanus* str. Walvis Bay was also released by GenBank [CP003221].

Boualem Hadjerioua was part of the Hydro Vision International 2012 Technical Papers Committee Meeting reviewers who met Monday, December 11th in Las Vegas.

The article appearing in the *Journal of Power Sources*, "Quantifying the water content in the cathode of enzyme fuel cells via neutron imaging" (196: 1769-1775) was selected to appear in the next edition of Renewable Energy Global Innovations. ORNL coauthors include Abhijeet Borole and Costas Tsouris. Learn more about Renewable Energy Global Innovations at http://reginnovations.com/.

The National Hydropower Asset Assessment Program (NHAAP) team members Boualem Hadjerioua, Shelaine Hetrick, and Brennan Smith will attend the NHAAP Methodology Review. Boualem Hadjerioua will present to a review panel the Methodology-Approach and preliminary

(2-sub regions) results of the New Hydropower Site Development Project in Washington, D.C., December 12th-13th.

During December 14th-16th Frank Löffler served on a National Science Foundation (NSF) Molecular and Cellular Biosciences panel titled "Metabolism and Microbial Communities" in Washington, D.C.

On December 15th the Biosciences Division (BSD) Awards were presented. Steve Brown received the Science Award for Junior Staff, Scott Hamilton-Brehm received the Post-Graduate Award, Sara Jawdy received the Technical Support Award, and Carmen Foster received the Administrative Award.

Steve Lindberg and Jack Calvert (former members of ESD) have received one of the 2011 Haagen-Smit Prizes for their paper, Mechanisms of mercury removal by O_3 and OH in the atmosphere, (*Atmospheric Environment*, 39: 3355-3367). Read the article online at http://www.sciencedirect.com/science/article/pii/S1352231005001585. The Haagen-Smit award is named in honor of Arie Jan Haagen-Smit, a Dutch chemist and pioneer in the field of air-pollution. Haagen-Smit was also one of the original editors of the *International Journal of Air Pollution*.

On December 15th Keith Kline, Mark Downing, Yetta Jager, Tim Theiss and Virginia Dale participated in a DOE Biomass Program roundtable discussion on sustainability.

Yetta Jager attended the 4th annual Davis Water Management Workshop in Davis, CA, and presented the results of an optimization of seasonal water releases to maximize salmon production.

Brian Davison organized the Defense Advanced Research Projects Agency (DARPA) Young Faculty Award (YFA) visit and presentations.

During December 18th-20th ORNL B&ESD researchers studying mercury were prominently cited in a 3-day series of articles written by Frank Munger in the Knoxville News Sentinel. The 12 articles in the series can be viewed at http://blogs.knoxnews.com/munger/2012/01/wrap-up-on-mercury-project.html. Interviewed scientists included Liyuan Liang, Scott Brooks, Steven Brown, Jeremy Smith, Teresa Mathews, Mark Peterson, John Smith, and Mike Ryon. Interviews with Gary Jacobs and Thom Mason highlighted the value of ORNL mercury research. The series of articles appeared to be a balanced overview and has been well received by those concerned about the mercury contamination issues in Oak Ridge.

Glenn Cada continued his participation in the Tier 1 group of Federal agencies that is advising NOAA's Office of Ocean and Coastal Resource Management on the environmental issues associated with Ocean Thermal Energy Conversion (OTEC). On December 19th he provided comments on an OTEC Needs Assessment document prepared for NOAA by the University of New Hampshire's Coastal Response Research Center, and participated in a conference call related to environmental impacts and environmental monitoring.

On December 20th the final report was distributed for "The Billion Ton Study: What can be Learned about Bioenergy Sustainability?" workshop which was held September 28th-30th. A full report can be found at http://www.ornl.gov/sci/ees/cbes/workshop.shtml.

Jerry Tuskan and Bob Cottingham attended the Joint Genome Institute (JGI) Science and

Operation Review representing ORNL.

Brian Davison has been named to the editorial board of the journal, *Industrial Biotechnology*.

Olaf Czarnecki published a part of his doctorate thesis work in the December issue of *The Plant Cell*. This journal has a 5-year impact factor 10.648, the highest impact factor of primary research journals in plant biology. The research article will be highlighted as a commentary in the same issue. Olaf received his Doctor of Philosophy (Ph.D.) degree from the Humboldt University Berlin in Germany. Currently he is a postdoctoral research associate at ORNL, working with Jay Chen and Jerry Tuskan in the Plant Systems Biology group.

On December 21st Shahab Sokhansanj visited the recycling yard of Cloverdale Fuels located in Langley, British Columbia. Cloverdale Fuels is the winner of the long-term contract (5 years) to supply wood fuel chips to the University of British Columbia (UBC) for combined biomass gasification for heat and power production (2 MW power). Shahab and one of his graduate students collected samples of raw biomass and samples of blends of fuel chips for detailed analysis. They will evaluate the sampled chips for particle size, moisture content, bulk density, ash, and chlorine. Using these data they will develop statistical sampling and fast evaluation methods for fuel properties. They will also investigate the logistics of the fuel supply and develop models for optimizing the supply chain. The UBC plant will start test burns towards the end of February 2012.

Scott Brooks completed work on the National Research Council Committee on Uranium Mining in Virginia. After more than 13 months of work, an exhaustive external review, and responding to approximately 140 pages of review comments, the committee released its report in December 2011. The study was requested by the Commonwealth of Virginia after owners of a large uranium deposit at Coles Hill in southern Virginia and other groups began in recent years to call for an end to the moratorium. The committee was asked to assess the physical and social context in which uranium mining and processing might occur, national and global uranium markets, technical options and best practices for uranium mining, processing, and reclamation, and potential impacts on public health, worker safety, and the environment. It was also requested to review the state and federal regulatory framework for uranium mining, milling, processing, and reclamation. The report's release was met with spirited reactions from all sides of the issue. The state General Assembly had braced for a vigorous 2012 legislative campaign to lift the mining moratorium. In light of the Committee's report, on January 19, 2012, Virginia Governor Bob McDonnell asked the General Assembly to take no action to permit uranium mining during its 2012 session, calling instead for the continuation of the state's moratorium on uranium mining pending a comprehensive and site-specific study of the issue to be completed by a newly-created multi-agency state workgroup.

Jonathan Mielenz, with co-investigators Xiaohan Yang and Tim Tschaplinski, was awarded Seed funding for a project titled "Biofuel Production from Multiple *Agave* Species."

The article "Prodigal: prokaryotic gene recognition and translation initiation site identification," featured in *BMC Bioinformatics*, has been listed as the "Fast Breaking Paper" in the field of Computer Science by the website Science Watch (http://sciencewatch.com/dr/fbp/2011/11octfbp/) for the period spanning the second bimonthly period of 2011 to the third bimonthly period of 2011. Fast Breaking Papers obtain the largest increase in citations in their field over a particular time period. Read the original article, coauthored by Doug Hyatt, Gwo-Liang Chen, Philip LoCascio, Miriam Land, Frank Larimer, and Loren Hauser, at http://www.biomedcentral.com/1471-2105/11/119/abstract.

BESD News Arrivals

(no new post-grads or staff)