



Newsletter

MAY/JUNE 2011 VOLUME 2, ISSUE 4

OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE U.S. DEPARTMENT OF ENERGY

LETTER FROM CCSI LEADERSHIP

Having never really arrived, it is ironic that I am now saying good-bye. On the other hand, over the last two years, I have developed a strong connection to what I know is a great organization-in-the-making. It is with a sense of loss that I leave ORNL and CCSI and return to LLNL. I believe, however, that the CCSI is demonstrating its strength by having fantastic younger scientists to fill the positions I left. The Institute is in capable hands, and the future is bright despite the bad news that surrounds us all. I believe the CCSI strategy is sound and provides a basis for continued success in tough times. Although the plans for execution must be adjusted to account for the big changes in the external environment, the framework is robust and should serve the organization well for several years.

Everyone should know that my reasons for leaving are more personal than professional. The decision to join ORNL in 2009 was a difficult one, as was my decision to leave. In both instances, I had a job I enjoyed and worked with great people. I considered a number of personal and professional factors and tried to identify the right balance. In the end, my desire to stay out west tipped the scales. I greatly appreciate the generous offer by Martin Keller to allow me to continue my remote work arrangement, but that would not be fair to you, my ORNL colleagues. You deserve my best effort, and after two years, it was clear that was only possible should I be at ORNL day-to-day. Our business requires collaboration, both formal and, especially, informal, which is just not practical from 2,500 miles and three time zones away.

Most importantly, I want to express my gratitude and appreciation to Gary, Jim, and Mary for their collegiality, and even more, their friendship. In my entire career, I have never worked with such a cohesive team. Our different perspectives led to healthy discussions, but never any conflict, as we all shared the common vision of a comprehensive climate science center of excellence.

Finally, I want to thank Martin and Jeff Nichols, for their support of our vision and willingness to put organizational considerations aside to try something different. I know their risk will be rewarded because of the outstanding accomplishments by CCSI.

— Dave

MAYES RECIPIENT OF AUERBACH AWARD FOR EXCELLENCE IN ESD



Melanie Mayes was announced as the winner of the Stanley I. Auerbach Award for Excellence in Environmental Sciences. This award is presented to an individual or team

within the Environmental Sciences Division (ESD) in recognition of sustained, high-quality, creative scientific contributions in support of basic research, technology development, or analysis as demonstrated by publication in refereed journals of high reputation or by significant impact through application of science in solution of complex environmental problems. The

selection committee is composed of ESD Senior Research Staff Members who inform the Division Director of their choice. Co-chairs this year were M.D. Cheng and Rich Norby. Melanie was recognized for her research on coupled hydrological and geochemical mechanisms that govern the migration of radionuclides and toxic metals in the vadose zone and molecular-scale mechanisms of stabilization of organic matter on mineral surfaces in soil. The nomination highlighted her enthusiasm to explore new opportunities, independence in thought and formulating scientific ideas, thoroughness in executing research in collaboration with others, and her excellence in communication via publication and professional service.

BHADURI NAMED CORP FELLOW



Budhendra (Budhu) Bhaduri has been named as a UT-Battelle corporate fellow. In addition to being the group leader of the Geographic Information Science and Technology group, he is a founding member of DOE's Geospatial Sciences Steering Committee. Budhu's current responsibilities at ORNL include conceiving, designing, and implementing innovative geocomputational methods and algorithms to solve a wide variety of national and global problems involving population dynamics modeling, natural resource studies, transportation modeling, critical infrastructure protection, and disaster management.

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Highlighted Researcher

PAUL HANSON



Paul Hanson was raised and educated in Minnesota where he began his college career on the accounting track. However, after a year-long immersion program in Denmark where he encountered a great environmental science instructor, Paul transferred to plant biology, ultimately earning his BA in biology and his MS and Ph.D. degrees from in plant and forest tree physiology. Within days of defending his dissertation, Paul and his wife packed up their car and a U-Haul and headed to Tennessee with their two-year old son strapped between them on a folding chair. According to Paul, his hobby has been raising his two boys which he has expanded to include traveling with his wife. Paul also spends time on his family genealogy where he has been able to track back the ancestors on his mother's side to the 1500s.

Paul began his ORNL career as a postdoctoral research associate working on air pollution and vegetation, transitioning to ozone research and later into his current area of expertise – climate change – in which he has worked for the past ten years. He is also the Ecosystem Science Group Leader. Paul has always been drawn to working on scientific issues that are relevant to societies' interests and concerns. He is currently focused on quantifying the level of concern that the public and society should have about specific climate change issues.

One of the most notable projects for Paul was the Throughfall Displacement Experiment (TDE) which is a 13-year project established to provide data on the responses of forests to altered precipitation. The TDE, located on the Walker Branch Watershed, was one of the largest field manipulations of precipitation in the world. "Through TDE, we were able to learn a tremendous amount about eastern deciduous forest resiliency in the face of extreme drought," remarked Paul.

Another career highlight was the ability to work with Julia Gaudinski and Susan Trumbore, visiting collaborators in 1999, who discovered the carbon-14 pulse on the Oak Ridge reservation while making measurements for Julia's Ph.D. dissertation. This work eventually morphed into the Enriched Background Isotope Study (EBIS-Oak Ridge) with the primary goal of gaining knowledge on soil carbon

cycling using isotope tracer methods. This interaction evolved into a strong collaborative relationship which still exists today as the EBIS-AmeriFlux project where similar work is being conducted across the eastern United States.

Between 2004 and 2009, Paul was invited to work with the DOE as Chief Scientist for the Program for Ecosystem Research with Jeff Amthor. Paul has continued to evolve as the environmental science landscape changed from his work on air pollution and acid precipitation as an ORNL postdoctoral research associate to his current role as a principal investigator (PI) and multi-institutional research coordinator of a multifactor climate change study in northern Minnesota. "I would never have guessed that I would have been doing this 25 or 30 years ago," stated Paul.

PI for the Spruce and Peatland Responses Under Climatic and Environmental Change (SPRUCE) Project (initiated in FY07)

Currently, Paul is leading the cutting edge SPRUCE project which will assess the response of northern peatland ecosystems to increases in temperature and exposures to elevated atmospheric CO₂ concentrations. This project brings many new challenges since these ecosystems are 1,500 miles from ORNL. SPRUCE has given Paul the opportunity to work with a diverse set of ORNL experts in engineering and complex systems modeling for the collective develop-

ment of new experimental technologies. Working on SPRUCE infrastructure takes him away from his biological expertise but allows him to "build really cool things like the SPRUCE warming enclosure." This objective of this type of technology development is to provide cost effective ways to allow climate change scientists to measure ecosystem responses that cannot be measured along temporal or spatial gradients in the world as it exists today.

Paul is a subject editor for *Global Change Biology*, and he has just completed work as a member of the Environmental Protection Agency's Clean Air Science Advisory Committee efforts on criteria air pollutants. He is also a current member of NASA's ORNL Distributed Active Archive (DAAC) User Working Group. Paul previously also served on the board for Tree Physiology and as an editor for the *Journal of Environmental Quality*. Paul has numerous publications and was recently recognized for a paper he co-authored with Nelson Edwards, Charles Garten, and J.A. Andrews in 2000 ("[Separating Root and Soil Microbial Contributions to Soil Respiration](#)") which has reached the distinction of being cited over 500 times as of the first week of June.

What role does your research play in climate change research?

"I conduct environmental research on intact ecosystems exposed to hypothetical future climatic and atmospheric condi-

HANSON (CONT.)

tions that are not duplicated in the current range of natural conditions. Such data are essential for developing process-level understanding of key physiological, biogeochemical and ecological processes embedded within models intended for use in the prediction of future ecosystem responses to climatic and other environmental changes.”

Who is the customer for your research?

“Our research is funded by the US DOE Office of Science to provide fundamental knowledge on how energy technologies and their use may impact biological systems. The data and research conclusions are produced to provide defensible data for consideration and use by policy makers and the public.”

Why is it important to you, personally, to become involved in climate change research?

“Uncertainties about the potential impact of Climate Change on organisms and ecosystems continues to drive the need for our experimental work on warming, precipitation change, and the response of organisms to altered atmospheric conditions. Quantitative research on climate change effects is needed to drive a discussion of impact from a dialog of 'maybes' to a logical progression of most likely responses (good or bad) associated with antici-

pated future environmental conditions.”

In what direction do you see the future of climate change research going?

“Research on viable climate change projections and the impacts to be expected from such changes will continue to be needed in the future. There are no simple or cheap solutions for the mitigation of global warming and it hypothesized consequences (or benefits). Research that better defines such endpoints will be critical for defensible assessments of risk needed for future policy discussions surrounding climate change.”

PROJECT EXPANDED ON CLIMATE CHANGE IMPLICATIONS FOR “BUILT INFRASTRUCTURES”

Since 2007, DOE's Integrated Assessment Research Program (IARP) has engaged ORNL in strengthening the capacity of Integrated Assessment Research in general and Integrated Assessment Modeling, in particular to address questions about possible impacts of climate change and possible adaptive responses. As an extension of the IARP effort, ORNL, in collaboration with the Los Alamos National Laboratory, has received a scope augmentation of the Assistance with Incorporating Impacts into Integrated Assessment project to (a) strengthen the capacity to analyze climate change impacts of and responses to

ALLEN DEFENDS MS THESIS

At the end of June, Melissa Allen, a CCSI student, successfully defended her MS thesis in Civil and Environmental Engineering at the University of Tennessee. Melissa's thesis title was “The Effects of Varying Physical Parameterizations and Initial Conditions on Tracer Transport in the National Aeronautics and Space Administration's Goddard Earth Observation System Model, Version 5.” We will continue to be colleagues with Melissa as she starts her Ph.D. Fellowship program in the CIRE activity in August.

Congratulations Melissa!

GRIFFITHS HONORED IN DOCTORAL GRADUATE CERIMONY

Natalie Griffiths, a CCSI postdoctoral research associate, 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.

Congratulations Natalie!

climate change of built infrastructures in the United States, linked to ongoing integrated assessment modeling efforts, (b) improve capacities to explore and understand issues of infrastructure vulnerability and fragility as climate change combines with other system stresses, and (c) connect with, inform, and be informed by other DOE critical infrastructure activities of interest to DOE. This project is funded for \$500K in FY11 and \$700K per year in FY11 and FY12. Tom Wilbanks, PI, is organizing a scoping/kickoff workshop in Washington, DC for July 20, 2011.

Highlighted Research

ORNL DAAC

The ORNL DAAC is one of 12 discipline-focused data centers operating as part of the NASA EOSDIS data centers managed by the Earth Science Data and Information System (ESDIS) Project. ESDIS is responsible for providing scientists and other users access to data from NASA's Earth Science Missions. The mission of the ORNL DAAC is to assemble, distribute, and provide data services for a comprehensive archive of terrestrial biogeochemistry and ecological dynamics observations and models to facilitate research, education, and policy formulation in support of NASA's Earth sciences.

This archive is used principally by researchers for studying global environmental change but is also used by a variety of other scientists. The archive includes both ground-based and remote-sensing measurements related to biogeochemical and ecosystem processes. Sources of data include NASA-funded field campaigns, selected relevant measurements from EOS satellites, and other biogeochemical dynamics data useful to the global change research community. The use of ground-based measurements is a key part of understanding the significance of EOS satellite data. Data from NASA and other sources archived at the ORNL DAAC are used to validate remote sensing data and to parameterize and validate models of local-, regional-, and global-scale processes for projecting changes in the Earth's ecosystems.

Led by Chris Lenhardt, the ORNL DAAC staff are responsible for data archiving value-added product development and distribution, and user support for biogeochemical and ecological data and models.

Having reliable and easy access to data about the climate and the terrestrial ecosystem is critical for understanding climate change, improving models, and understanding impacts and vulnerabilities. The ORNL DAAC plays a key role in this effort, particularly as a bridge between the terrestrial ecology, remote sensing, and modeling communities.

As with most scientific archives, the ORNL DAAC has expanded its holdings and services in order to better serve its users, and both its data deliveries and usage continue to grow significantly. It continues to work with the [Mercury Consortium](#) to extend and expand its

metadata services. Since its inception, the ORNL DAAC has also added to Mercury's repertoire.

Typical users of the ORNL DAAC include field ecologists, carbon flux investigators, educators, as well as some relatively new data users such as ornithologists and phenologists, through provision of the Moderate Resolution Imaging Spectroradiometer (MODIS) subsetting tool.

In the near term, the ORNL DAAC will continue to expand its [pilot project](#) with Alaska Satellite Facility to make Synthetic Aperture Radar (SAR) data available to the ecological community. The goal is to expand the image time series of data to allow for more in-depth analysis at a given site.

On the horizon, ORNL DAAC will begin ramping up in FY13 to take delivery of data products in the FY14-15 timeframe for two new airborne missions for which

NASA has named the ORNL DAAC the archive of record*:

Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) - Jet Propulsion Laboratory (JPL).

This investigation will collect an integrated set of data that will provide unprecedented experimental insights into Arctic carbon cycling, especially the release of the important greenhouse gases such as carbon dioxide and methane.

Airborne Microwave Observatory of Subcanopy and Subsurface (AirMOSS) - University of Michigan & JPL.

To better understand the spatial distribution and magnitude of greenhouse and other gases, emissions on a continental scale, this investigation addresses the uncertainties in existing estimates by measuring soil moisture in the root zone of representative regions of major North American ecosystems.



Figure 1. SAR data from Canada.

*For more information on these missions, see the May 27, 2010 [Press Release](#).

DAAC (CONT.)

ORNL DAAC TOOLS

MODIS Subsets

The ORNL DAAC provides subsets of Land Products (vegetation characteristics, land cover, and productivity) from NASA's Moderate Resolution Imaging Spectroradiometer (MODIS) in a format and scale that are useful for field ecologists. The subsets, for land areas smaller than 200 x 200 km, are available for any location on Earth for the period 2000 - present every 8 to 16 days. These data can be readily used in data assimilation models or analyses of ecosystem processes. <http://daac.ornl.gov/MODIS>

FLUXNET

FLUXNET provides a wealth of information about flux tower data collection activities around the world. Flux Tower information ranges from geographic locations to land use classifications to network data repository information for individual sites. These site characteristics enable additional analyses, model evaluation, and scaling for use with the flux data files. The ORNL DAAC also provides subsets of remote sensing products (MODIS Land Products and Synthetic Aperture RADAR Products) that can be used to interpret flux data and ecosystem dynamics. <http://www.fluxnet.ornl.gov>

Spatial Data Access Tool

The ORNL DAAC offers over 50 geospatial data products through its Spatial Data Access Tool. SDAT uses standards from the Open Geospatial Consortium to enable users to acquire spatial data in custom projections, resolutions, and data formats http://daac.ornl.gov/spatial_data_access.shtml

NEW STAFF



Megan Maloney is a Post-Bachelor's Research Associate in the Environmental Sciences Division where she applies geographic analysis tools to support research on societal impacts of climate change and risk reduction through adaptation. Megan received a BA in environmental studies with a policy concentration from Sweet Briar College. After graduating, she continued to develop technical and policy interests through work with environmental nonprofits such as Manomet Center for Conservation Sciences and the Asheville Design Center. Currently, she analyzes extreme weather risks in conjunction with sea level rise projections to identify societal vulnerability and facilitate emergency services and infrastructure planning.

Upcoming CCSI Seminars

Suraje Dessai — July 21
Jim Randerson — July 25
Christa Peters Lidard — Sept 22

CALENDAR

Federation of Earth Science Information Partners Summer Meeting (Santa Fe, NM).....	12-15 July 2011
TeraGrid '11 (Salt Lake City, UT).....	18-21 July 2011
19th Conference on Applied Climatology (Asheville, North Carolina).....	18-20 July 2011
CCSI Seminar—Suraje Dessai [University of Exeter] (ORNL)	21 July 2011
Third International Conference on Climate Change (Rio De Janeiro, Brazil).....	21-22 July 2011
CCSI Seminar—Jim Randerson (ORNL)	25 July 2011
Community Earth System Modeling Tutorial (Boulder, CO).....	1-5 August 2011
96th Annual Ecological Society of America Meeting (Austin, TX).....	7-11 August 2011
Climate Science and Coastal Management Workshop (Charleston, SC)	8-12 August 2011
Computing in Atmospheric Sciences 2011 (Annecy, France)	11-14 September 2011
27th New Phytologist Symposium: Stoichiometric flexibility in terrestrial ecosystems under global change (Oracle, AZ).....	25-28 Sept 2011
Fifth Intl. Conference on Flood Management (Tsukuba, Japan).....	27-29 September 2011
ASA, CSSA, and SSSA International Annual Meetings (San Antonio, TX).....	16-19 October, 2011
ICCCGW 2011: International Conference on Climate Change and Global Warming (Venice, Italy).....	23-25 November 2011
Partners in Environmental Technology Technical Symposium and Workshop (Washington, DC).....	29 Nov-1 Dec 2011
92nd Amer. Meteorological Society Meeting (New Orleans, LA).....	22-26 January 2012
AAAS Annual Meeting (Vancouver, Canada).....	16-20 Feb 2012
2012 Ocean Sciences Meeting (Salt Lake City, UT).....	20-24 February 2012



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Coming in July's Edition

Highlighted Researcher: Bob Cook
Highlighted Research: Ultra High Resolution Global Climate Simulation



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RECENT PUBLICATIONS

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CURRENT CCSI JOB OPPORTUNITIES

We seek motivated individuals across a range of educational and professional experience including M.S. through Ph.D. academic qualifications at junior, as well as senior levels of experience to address some of the most pressing questions in global climate change science. You can view complete staff position descriptions and apply at <http://jobs.ornl.gov>. Postdoctoral and post-master's research position descriptions and online application are at <http://www.ornl.gov/ornl/postdocs/ornl-pd-pm/default.aspx>.

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