Natural Resource Ecology Laboratory
NREL News Notes
Colorado State University

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NREL ASSISTANT DIRECTOR RETIRES

Neil Shropshire, Assistant Director of NREL, has retired after 7 years of service to NREL, and 25 years of service at CSU. His valuable expertise and many contributions, in both financial and leadership matters, have been of great benefit to NREL. The scientific and support staff are extremely pleased to have Neil come back to NREL on a part-time basis beginning in February.

IN THE NEWS

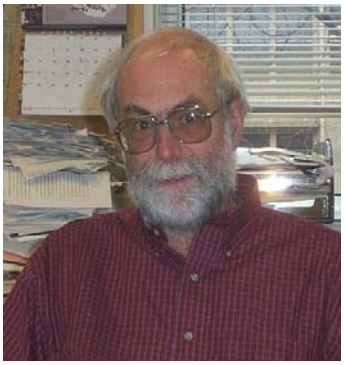
New York Times Cites Dr. Diana Wall's work in Antarctica

An article was published in the Nov. 21, 2006 edition of the New York Times featuring the work of Dr. Diana Wall, Professor, Dept. of Biology and Senior Research Scientist, NREL, in the freeze-dried landscape of the Antarctic Dry Valleys.

December 2006 marks Diana's 16th trip to Antarctica to study the tiny roundworms called nematodes, which occupy the top rung of the food chain in this pared-down ecosystem. Dr Wall, along with 910 colleagues, return each austral summer to research the "process of carbon turnover, how carbon travels through the ecosystem." "The cycling of carbon is the basis of life," said Ed Ayres, NREL Research Scientist working with Dr. Wall in the Dry Valleys.

The full article can be found at:
http://www.nytimes.com/2006/11/21/science/21prof.html?ex=1164776400&en=ca67dd900dfa8d74&ei=5070&emc=eta1.

AWARDS



Dr. Bill Parton, Senior Research Scientist at NREL, has been honored as an elected American Geophysical Union Fellow. This designation is conferred upon by no more than 0.1% of all AGU members in any given year. AGU has a diverse program for recognizing members and others who have made outstanding contributions to the advancement of the geophysical sciences, to the service of the community, and to the public's understanding. Congratulations Bill!

FORT/ NREL Scientist Receives NPS Regional Award

The National Park Service Intermountain Region (IMR) presented FORT ecologist/NREL Graduate Student Kate Schoenecker with the 2006 IMR award for Natural Resource Research on Feb. 21 at the Rocky Mountain Cluster Parks Resources meeting in Denver, CO. This award doubles as the IMR's nomination for the national Director's Award for Natural Resource Research. Ms. Schoenecker was nominated for "outstanding contributions in the field of ungulate research" in four IMR national parks. Through her widely recognized expertise in ungulate ecology (especially elk, bighorn sheep, and wild horses), her flexibility and productivity in developing and adapting research plans to park needs and requirements, and her skill in working across jurisdictions, Ms. Schoenecker has been instrumental in completing research and technical assistance that provided park personnel with the knowledge they need to make science-based decisions concerning wildlife and vegetation management.

RESEARCH NEWS

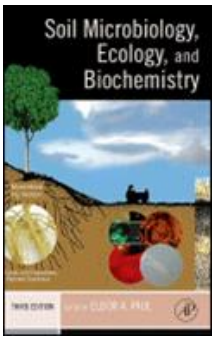
Dr. Mohammed Kalkhan (NREL) and **Dr. Thomas J. Stohlgren** (USGS/NREL) have received funding for two projects: NSF ($896,709) for “Using the GODM Cyberinfrastructure to involve citizen scientists in moving from data isolation to data integration;” and USGS ($49,000) for “Proposed integration of the global organism and monitoring system with invasive species forecasting system using an early adopters approach.”

Dr. Kalkhan was also awarded funding from NPS-Vegetation Mapping Program ($65,000) for “Research, Design, Development, and Implementation Technology in Support of the NPS Vegetation Mapping Inventory.”

Three NREL scientists were awarded funding for “mini-grants” through the Warner College of Natural Resources (WCNR) Teaching, Research and Outreach Grants Program.

- **Dr. Cameron Aldridge**, $9,401, “Stratton sagebrush research site: An experimental approach to assess various grazing treatments on vegetation and wildlife communities across managed burns and habitat control”
- **Kimberly Melville-Smith**, **Shannon Spencer, Dr. David Swift and Dr. John Moore**, $9,994, “Northern Colorado Ecology Watch: A seed grant proposal to develop an inquiry-based outreach program.”
- **Dr. Heidi Steltzer**, $5,374, “Do plant phenolics increase ecosystem nitrogen retention during snowmelt?”

PUBLICATIONS



Academic Press has just released the third edition of NREL Senior Research Scientist Dr. Eldor Paul's book **Soil Microbiology, Ecology and Biochemistry**. This classic textbook includes basic concepts and applications in agriculture, forestry, environmental science, and a new section entirely devoted to ecology. It guides students through biochemical and microbial processes in soils and introduces them to microbial processes in water and sediments. Soil Microbiology, Ecology, and Biochemistry serves as an invaluable resource for students in biogeochemistry, soil microbiology, soil ecology, sustainable agriculture, and environmental amelioration.

A newly released book by **Dr. Tom Stohlgren** (USGS/NREL), "*Measuring Plant Diversity"* (Oxford University Press, 2007), presents field and analysis methods that can more accurately describe plant biodiversity and help evaluate invasion vulnerability. The book empowers the reader to apply an experimental approach in the science of plant diversity to better understand the distributions of common and rare species, native and non-native species, and long-lived and short-lived species. Case studies from actual field investigations that demonstrate how to test and assess various field techniques are included.

A paper entitled "Global-scale similarities in nitrogen release patterns during long-term decomposition" written by **Dr. Bill Parton** with W. Silver, I. Burke, L. Grassens, M. Harmon, B. Currie, J. King, C. Adair, L. Brandt, & B. Fasth was published in the Jan. 19, 2007 issue of *Science (*315(5810):361-364). In addition, *Nature* will feature the article in the *Research Highlights* section of an upcoming issue.

Dr. Diana Wall guest edited a special issue of *Soil Biology and Biochemistry*. This special issue was devoted to soil ecology in the Antarctic Victoria Lands. The issue was a direct result of an NSF-funded workshop "Synthesis of Soil Biodiversity and Ecosystem Functioning in Victoria Land, Antarctica," organized by Diana Wall and held on Jekyll Island, GA in 2005.

A paper entitled "Serengeti wildebeest migratory patterns modeled from rainfall and new vegetation growth" by **Dr. Randall Boone** and collaborators S.J. Thirgood and J.G.C. Hopcraft was published in the journal Ecology (87:1987-1994). The paper demonstrates how spatial surfaces can be combined with evolutionary programming to model animal movements. The work is an offshoot of the NSF funded project "Biocomplexity, spatial scale, and fragmentation: implications for arid and semi-arid ecosystems (SCALE)" led by **Dr. N. Thompson Hobbs**.

Dr. Boone worked with collaborators C.J. Johnson and L.B. Johnson at the Natural Resource Research Institute, Duluth, MN, on a project exploring how forest fragmentation may reduce the likelihood that metapopulations of vernal pool amphibians will persist. Two papers were recently published from that work, one in Ecological Modelling (198:255-262) that describes using diffusion techniques to model movements of wood frogs between vernal pools, and another in Wetlands (26:581-592) that uses hydrologic modeling to predict vernal pool hydroperiods.

Additional Publications

Sunil Kumar, Tom Stohlgren, and **Geneva Chong**. 2006. Spatial Heterogeneity Influences Native and Non-native Plant Species Richness Ecology 87(12):3186–3199.

Wallenstein, Matthew, W.H. Peterjohn, and W.H. Schlesinger. 2006. Nitrogen fertilization effects on denitrification and N cycling in an aggrading forest. Ecological Applications 16: 2168-2176.

Wallenstein, Matthew D., S. McNulty, I. Fernandez, J. Boggs, and W.H. Schlesinger. 2006. Nitrogen fertilization decreases forest soil fungal and bacterial biomass in three long-tern N fertilization experiments. Forest Ecology and Management 222:459-468.

MEETINGS AND PRESENTATIONS

Dr. Diana Wall attended several meetings in September.

- Gave an invited lecture, *"Biodiversity and Ecosystem Processes"* at the Transantarctic Mountain Workshop at Ohio State University's Byrd Polar Research Center.
- Presented *"The Terrestrial Experience: Species Diversity and Ecosystem Functioning"* at the Census of Marine Life Workshop; and an invited talk "*Soils, Biodiversity and Links to Human Health"* at an EPA-sponsored workshop on Biodiversity and Human Health, both in Washington DC.
- Joined by her lab group, **Dr. Ed Ayres, Sanjay Advani**, and **Dr. Breana Simmons**, Dr. Wall attended the LTER All-Scientists Meeting in Estes Park. Ed and Breana were the lead authors on two posters:

  Ayres, E., et al. *Soil and sediment properties and invertebrate community structure across lake-soil transition zones in the McMurdo Dry Valleys, Antarctica.*

  Simmons, B. L., et al. *Effects of increased temperature and moisture on nematode abundance, diversity and biomass in the McMurdo Dry Valleys, Antarctica.*
- Dr. Wall's lab hosted the first meeting between the two Antarctic Long Term Ecological Research (LTER) sites. Scientists from the McMurdo and Palmer LTERs discussed commonalities in their data and made plans for synthetic and collaborative work between the two sites.
- Participated in the Horizons in Soils Research Workshop in London that aimed to define research agendas and needs for soil research in the United Kingdom.

In October, **Dr. Wall** attended the TARANTELLA meetings hosted by the Netherlands Institute of Ecology to define research directions for the upcoming International Polar Year (www.ipy.org) and delivered a talk entitled *"Long Term Terrestrial Experiments in the McMurdo Dry Valleys."*

In November, **Drs. Wall** and **Ayres** traversed the African continent. At sites in South Africa and Kenya, the two sampled soils for their NSF-funded "Patterns of Global Soil Biodiversity" project. The two sites are part of two global transects in a study designed to elucidate how soil biodiversity varies across latitudinal gradients.

Dr. Matt Wallenstein gave an invited talk "Effects of Increased Nitrogen Inputs on Soil Microbes: Implications for Decomposition and N Cycling" at the Soil Science Society of America's Annual Meeting in Indianapolis.

In September, **Dr. Randall Boone** attended a workshop at the Gobabeb Training & Research Center in Namibia sponsored by the Volkswagen Foundation. Scientists from Africa, Germany, and other countries, discussed research needs to improve the livelihoods of Africans. Dr. Boone demonstrated the value of integrated assessment and computer modeling in weighing effects of management and policy options.

Namibia Grass Sunset

In August, **Dr. Boone** attended the First World Congress on Social Simulation in Kyoto, Japan. He presented a poster summarizing progress on the project "Decision making in rangeland systems: an integrated ecosystem-agent-based modeling approach to resilience and change" funded by the National Science Foundation and led by **Dr. Kathleen Galvin** (Anthropology/ NREL). Their agent-based model representing livestock-owning households is now joined with the SAVANNA modeling system. They are working on decision making rules for the model.

Dr. Stephen Ogle attended the Fourth Lead Author Meeting, Nov. 10-13, for Working Group 3 in preparation of the IPCC Fourth Assessment Report. Dr. Ogle is a lead author in the chapter dealing with agriculture of the Mitigation Volume. The Fourth Assessment Report will be released during 2007.

Dr. Ogle co-convened a symposium with Dr. Scott Denning (Atmospheric Sciences, CSU) at the Fall Meeting of the American Geophysical Union in San Francisco, California in December. The symposium was entitled, "Regional to Continental-Scale Carbon Cycle Science: Progress in the North American Carbon Program, CarboEurope, and Related Programs," and had about 70 contributed presentations.

Steve also attended a wrap-up meeting in Costa Rica for a capacity-building project in Central America funded by US-AID and US-EPA. This project focused on improving greenhouse gas inventories for emissions sources and sinks in agriculture, forestry, and other land uses. Individuals from government ministries in each of the seven countries participated in training workshops during the project, which began in 2004.

The North American Carbon Project (NACP) was held in Colorado Springs January 22-26. **Dr. Dennis Ojima** presented a poster as part of his NASA Interdisciplinary Science project on data assimilation approaches to ecosystem carbon dynamics with Becky McKeown, Don Estep, David Schimel, and Jeff Sandelin as co-authors. Dennis was also asked to provide closing comments to the meeting. As an extension to the meeting, Dennis co-chaired a session at a joint Canadian, Mexican, and US meeting held on Human Dimension research issues related to the JNACP. Dennis' summary and further info can be found at:

http://www.nacarbon.org/2007_meetings/index.htm

Dr. Ojima was invited to present "Global Warming: Consequences and Impacts" at the Kansas Wildlife Federation annual meeting in Manhattan, Kansas on Feb. 10. The presentation led to a discussion of what Kansas can do to reduce its impact on global warming and to reduce their emissions of greenhouse gases.

Dennis participated in a review panel in Bethesda, Maryland, Feb. 11-15, sponsored by the NASA Earth Observation Science Program, to evaluate renewal of EOS instrument teams.

Dennis was invited to give a plenary talk: "Climate Change and Its Implication to Colorado Agriculture" at the Colorado Agricultural Outlook Forum on Climate Change in Denver on Feb. 21.

Dr. Mohammed Kalkhan participated as a lead instructor for "Geospatial Modeling and Mapping for Natural Resources and Ecological Applications" at the Remote Sensing Application Center, USDA Forest Service, Salt Lake City, UT, Oct. 30-Nov. 3, 2006.

Dr. Tom Stohlgren gave an invited lecture on invasive species science in South Africa in November. He also enjoyed taking photos of the beautiful Cape of Good Hope Coastline (below).

Cape of Good Hope Coast

GRADUATE STUDENT NEWS

Dr. Jim Graham (**Dr. Tom Stohlgren**, advisor) graduated with a PhD in Forestry. Jim plans to continue at NREL as a Research Scientist working with the National Institute of Invasive Species Science team to develop capabilities of the Global Organism Detection and Monitoring Database (NSF Cyber Infrastructure Grant OCI-0636213).

Jon Freeman (**Dr. Tom Stohlgren**, advisor) graduated in December 06 with his Master's thesis entitled "Rapid Response to Post-fire Plant Invasion."

Nate Ament is a new employee in Tom Stohlgren's group at the National Institute of Invasive Species Science, and is starting work on a graduate program this semester.

NREL 2007 Spring Seminar Series

Once again, NREL hosted a very successful and informative seminar series. We wish to thank all those who participated in this event.

Feb 9: **Dave Williams** (Departments of Renewable Resources and Botany, University of Wyoming) "*Applications of stable isotope measurements for early-warning detection of ecological change"*

Feb 16: **Alan Townsend** (Associate Director, INSTAAR, CU Boulder) "*Human Health Effects of Changing Global Nitrogen Cycles"*

Feb 23: **Heidi Steltzer** (NREL) *"Integrating new methods into ecosystem science: plant genetics, ground-based remote sensing, model selection, and novel experimental designs"*

March 2: **Sunil Kumar** (NREL) "*Spatial heterogeneity influences native and nonnative plant species richness in Rocky Mountain National Park, Colorado"*

March 9: **Ashley Ballantyne** (NOAA, Boulder) *"*Peering into the carbon pool: molecular constraints on trophic interactions in aquatic ecosystems*"*

March 23: **Kiona Ogle** (Departments of Botany & Statistics, Univ. of Wyoming) *"A Bayesian Deconvolution Approach to Partitioning Soil Respiration"*

March 30: **Ken Reardon** (CSU-Engineering) *"Proteomics: a new tool for ecology?"*

April 6: **Cory Cleveland** (CU-Boulder INSTAAR) *"Element stoichiometry in terrestrial ecosystems: How do nutrient ratios inform our understanding of ecosystem function"*

April 13: **John Moore** (NREL) *"Trophic structure, biodiversity, and nutrient dynamics of soils ecosystems"*

April 23: **Patrick Martin** (CSU-Landscape Architecture) *"Spatially-explicit ecosystem modification by exotic trees as a mechanism of invasion of eastern forests"*

NEW PEOPLE AT NREL

Dr. Diana Wall's lab welcomed Sarah Atherton, a sophomore majoring in zoology and biology, to their team. Sarah is an REU student working on nematodes as part of the McMurdo LTER project. Her research will further investigate the environmental conditions necessary for Plectus antarcticus to effectively enter and exit anhydrobiosis, a state that allows these nematodes to survive when soils are frozen or dry. This adaptation is essential for nematodes to persist in the McMurdo Dry Valley's extreme environment.

News from the NREL UVB Program

Department and Program Updates

Dr. Jim Slusser traveled to Stockholm, Sweden to chair the SPIE European Conference "Remote Sensing of Clouds and Atmosphere." He presented, "Determining Ozone and Aerosol Optical Properties from UV-RSS." He also presented Ultraviolet Ground and Space-based Measurements, Models, and Effects research by Dr. Peter Kiedron, CSREES, NOAA. Tommy Taylor, of Atmospheric Science presented results from an algorithm which has been developed as part of his Masters degree. The data was collected during the MIRAGE-MEX field campaign in spring 2006 using instruments that were supported by the NREL-UVMRP. Dr. Glenn Shaw, Univ. of Alaska, one of Dr. Slusser's graduate advisors, also attended and presented "Doing Science with a Sun Photometer." He built the first precision multi-wavelength sun photometer. His design is now a common instrument used in global networks.

Dr. Slusser met with Dr. Gunther Seckmeyer, a world expert in calibration and analysis of UV-B data, at the Institute for Meteorology and Climatology, Univ. of Hanover, in Germany. Dr. Slusser also visited the Univ. of Gottingen to pay respect to some of the mathematical physicists he has collaborated with in the past: Gauss, Reimann, and Hilbert.

Dr. Wei Gao, a SPIE symposia committee member of the International Society of Optical Engineering, chaired the international conference "Remote Sensing and Modeling of Ecosystems for Sustainability III" during the society's annual meeting (Aug. 13-17, San Diego). Dr. Gao and his graduate students also presented several papers.

Dr. Xinli Wang spent the month of October in Champaign, IL working with researchers to build an infrastructure to incorporate the crop model into a regional climate model; the Climate Extension Weather and Research Forecasting Model.

Visiting Scientists

Andres Hernandez, graduate student from Mexico City, Mexico, visited UV-B to evaluate the results of the NSF project "Collaborative Research: Impact of aerosols on the photochemistry of Mexico City," using the data set from the MIRAGE-Mex. Colorado State Univ. provided the Ultraviolet Multifilter Rotating Shadowband Radiometer (UV-MFRSR) to measure the total and diffuse downwelling irradiance at several UV wavelengths to calculate aerosol optical depths during cloud-free conditions.

Dr. Alain Sarkissian, from the Centre National de la Rechirche Scientifique, Verrieres-Les-Buisson, France, world renowned for his work in trace gas aerosol retrieval of planetary atmospheres came to UV-B to work on the aging, and now obsolete, seven channel UV-B radiometers. It is imperative that work begins now on the next generation of instrumentation. Dr. Sarkissian worked with Dr. Slusser and Roger Tree to test a new short focal length spectrometer that will have direct sun pointing capabilities. He performed thermal, optical, and electronic tests to demonstrate the feasibility of using these spectrometers to place in the field.

Dr. Zhiqiang Gao, from the Chinese Academy of Sciences in Beijing, is working with UV-B to analyze the changes and trends of UV-B data and to produce the temporal and spatial UV-B distributions by using Arc-GIS software during his visit. He has prepared the parameters needed in both climate and crop models by using MODIS data.

Books and Publications

Dr. Wei Gao was co-editor of a two-volume book: "*Earth Science Satellite Remote Sensing*," which was published by Tsinghua and Springer in September 2006. He was also the leading editor for "*Remote Sensing and Modeling of Ecosystems for Sustainability III"* which was published by The International Society of Optical Engineering in October.

New UV-B Graduate Students

The UV-B Program welcomed Bill Smith, from North Carolina, and Chelsea Corr, from Albany, New York, in September. Bill Smith is working with **Drs. Wei Gao** and **Jim Slusser** (UVB), **Drs. Bill Parton** and **Heidi Steltzer** (NREL), and Dr. Jack Morgan (USDA-ARS-Rangeland Resources) to study the influence of UV-B on competition between native grasses and invasive Tamrisk, typical in Colorado rangeland. Drs. Slusser and Sonia Kreidenweis (Atmospheric Science, CSU) will mentor Chelsea as she analyzes optical and chemical UV data for air quality study in Houston, TX. This study will investigate the interactions between UV transmission through a polluted atmosphere and the pollution process itself.

NREL Staff and Scientists' Special Events

During winter break 2006-07, **Greg Newman**, NREL Research Associate, took part in an expedition, along with 11 others from the CSU's Outdoor Adventure Program, to climb Argentina's 22,840-foot Cerro Aconcagua. This was quite a feat given that the overall success rate for reaching the top of Aconcagua is only 30 percent. They spent 10 days climbing to the summit, then traversing the peak and descending through the Rio Horconnes Valley on the opposite side. There were many obstacles to overcome, such as a collapsed bridge, storms, and one team member who was unable to complete the trek due to shortness of breath and had to be taken off the mountain via helicopter. The amazing thing for Greg is that he is a cancer survivor, and the successful completion of this journey proved to himself that he is back to full health.

Read the full and very inspiring story on page 8 of the spring 2007 issue of CSU Magazine (http://www.international.colostate.edu/forms/COst07spr.pdf).

The team on the 22,840-foot summit includes (back row from left) Greg Newman, Jan Rastall, Austin Krcmarik, James Werning, Seth Webb, Andy Zimmerman, Kathryn Damby, Megan Voiles, and Jordan White. In front are Kirstin Nelson and Pat Rastall. Not shown is Erik Beke.

Paul Evangelista, NREL Research Associate, spent four weeks in Ethiopia conducting volunteer work for The Murulle Foundation. Paul, Bob Waltermiere (USGS), and Arpad Lazar (NPS) conducted a one-week training seminar on GIS for the Ethiopian Wildlife Department. Textbooks for all participants were donated by **Dr. David Theobald** (NRRT/NREL). The rest of the time was spent in a remote part of the Bale Mountains collecting data on vegetation and confirming the existence of a new population of mountain nyala (an endemic antelope) never previously documented.

Paul was invited to be an advisor to the IUCN Antelope Specialist Group, East Africa for determining the population and status of the mountain nyala. A report was submitted by invitation that will be printed in an upcoming book chapter entitled *"IUCN Status Report of East African Antelopes*."

Additionally, a paper co-authored by Paul with R. Engeman has been accepted for publication in the African Journal of Ecology entitled "*Investigating the feasibility of a passive tracking index for monitoring wildlife in the lower Omo Valley, Ethiopia.*" The paper is currently online (http://www.blackwell-synergy.com/toc/aje/0/0) and in print for 2007.

Megan Steinweg, NREL graduate student, had a beautiful 9 lb. 1 oz. baby girl, named Rebekah, on October 20.

Sunil Kumar, NREL graduate student, and his wife Madhu, welcomed their new baby boy, Ayush, on November 3. He weighed 5 lbs and 2 ounces.