



**Kelly Grogan** received a travel grant to present his research at the Health Physics Society Annual Meeting in Salt Lake City this summer. He also presented at The Savannah River Health Physics Society Technical Seminar on Friday (April 16).

**Kelly** was selected as the recipient of the 2010-2011 Robert S. Landauer Fellowship for graduate studies in health physics. This fellowship is sponsored by Landauer Incorporated. The award will be in the amount of \$6,000 for the purpose of supporting his graduate work at Clemson University this coming academic year. In addition, he will be provided with a travel grant of up to \$800 to attend the 2011 HPS Annual Meeting in Palm Beach, Florida.

Riley Grogan was born Jan. 2 at 12:57 pm to Ashley and **Kelly Grogan**. Riley was the 2<sup>nd</sup> baby of the year! She was 6 lb 8.5 oz and 19.5 inches. Congratulations Kelly and Ashley!

**Darryl B. Jones** master thesis, "The Formation and Control of Iodinated Trihalomethanes in Drinking Water Treatment" was selected to receive the American Water Works Association (AWWA)'s First Place 2010 Academic Achievement Award for the best Master's Thesis.

As the winner, Darryl will receive a \$3,000 check and plaque, and **Dr. Tanju Karanfil** will receive a plaque as the research advisor during the A.P. Black Research Plenary Session on June 22, 2010 at the AWWA Annual Conference in Chicago.



**Jose Alfaro**, working with **Dr. Shelie Miller**, was selected as one of the recipients of the National Science Foundation 3-year graduate research fellowships (NSF GRF) for students in science, engineering, mathematics, technology, and some social sciences. These are very prestigious awards with a generous support package (\$45k/year).

**Amy Hixon** and coauthors published a manuscript titled "Influence of Iron Redox Transformations on Plutonium Sorption to Sediments" in the international journal Radiochimica Acta. She also presented at The Savannah River Health Physics Society Technical Seminar on Friday (April 16).

## 2009-2010 Grad Student Awards



Congratulations to the following Graduate Students shown above from left to right that received this year's awards: **Jose Alfaro** (South Carolina Environmental Scholars Award), **Anthony Reid** (A. Ray Abernathy Fellowship), **Dr. Tanju Karanfil**, **Amer Kanan** (South Carolina Environmental Scholars Award), **Merik Selbes** (L.G. Rich Fellowship), and **Richard Hall** (South Carolina Environmental Scholars Award).

**Shannon Thompson** won a travel award to present his dissertation work at the upcoming national meeting of the American Chemical Society.

Title: Correlations between the uptake of Fe and Pu in corn (*Zea mays*). Authors: **Thompson, SW**<sup>1</sup>, **Molz, FJ**<sup>1</sup>, Kaplan, DI<sup>2</sup>, **Powell, BA**<sup>1</sup>, **Fjeld, RA**<sup>1</sup>. <sup>1</sup>Clemson University Department of Environmental Engineering and Earth Sciences; <sup>2</sup>Savannah River National Laboratory



Grass plants exude siderophores to acquire iron from soils. Research suggests plants may accumulate Pu(IV) during Fe(III) acquisition because of similar ionic charge to size ratios. However, this has not been tested in plants. Experiments were conducted to characterize plant uptake of Fe and Pu. Corn was grown in soil pots above solutions with their primary roots in solution. Growth conditions were 14/10 h day/night cycles (32/21 C), 50% RH, and photosynthetic flux of 1300-1500  $\mu\text{mol}/\text{m}^2\text{s}$ . At 23 days, solutions were spiked with 37KBq each of  $^{59}\text{Fe}$  and  $^{238}\text{Pu}$  complexed with  $9.9 \times 10^{-5}$  M DFOB, a bacterial siderophore. Accumulation in corn was measured using liquid scintillation. Distributions are compared with other elements using ICP-MS. The  $^{59}\text{Fe}$  and  $^{238}\text{Pu}$  distribution was similar in shoots with a Fe:Pu concentration ratio of 1.3 whereas concentration ratio in roots was  $\sim 0.15$ , indicating less Pu was transported across root tissue layers.

**Shannon** has presented this research at the ACS meeting in San Francisco, CA. in March. He also presented "Plant Plutonium (Pu) Velocity Measurements and Retardation Estimates Provide Strong Evidence That Grass Plants Can Affect the Transport and Distribution of Pu in the Shallow Vadose Zone" at Clemson University Hydrogeology Symposium in April.

**Shannon** will graduate May 7th and has accepted a position as a Principal Radiological Scientist with HGL (HydroGeoLogic, Inc.) in Simi Valley, California beginning April 19<sup>th</sup>. Shannon and Beth will relocate to California in mid-May.

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**Viet Dang** presented some of the results from his PhD research at the First International Conference on Environmental Pollution, Restoration and Management at Ho Chi Minh City, Vietnam on March 3, 2010. He was awarded one of the student prizes for his platform presentation.

Viet and his wife, Vu, gave his advisor, **Dr. Cindy Lee**, a great tour of their home city of Hanoi. Viets' family also hosted **Dr. Lee** to a wonderful dinner.



**Environmental Engineering Undergraduate Degree**



**EEES**, in conjunction with **Biosystems Engineering**, now offers an Environmental Engineering Undergraduate Degree. We will offer a BS degree in Environmental Engineering and a BS degree in Environmental Engineering with a Natural Systems Concentration. It is the only program degree of its type in South Carolina.

The degree is generating a lot of interest with students already signing up. Our thanks to everyone who helped pull this new degree program together and get the information out to the public.

**US News and World Graduate Program Rankings** for 2010 were announced. The **EEES Environmental Engineering graduate program** was ranked 17<sup>th</sup> among public universities and 28<sup>th</sup> including both public and private universities among 95 programs around the country. Environmental Engineering is the highest ranked graduate engineering program in the University.

**18<sup>th</sup> Annual Clemson University/David S. Snipes Hydrogeology Symposium**

The 18<sup>th</sup> Annual Clemson/David S. Snipes Hydrogeology Symposium was held on April 1<sup>st</sup> at the Clemson Madren Center along with field trips to the Glassy Mountain area north of Greenville, South Carolina on March 31<sup>st</sup> and April 2<sup>nd</sup>.

This year’s event attracted over 300 attendees with most from South Carolina but others coming from North Carolina, Georgia, Tennessee, Virginia, Mississippi, and Florida.



Attendees registering for symposium

There were fifty oral and poster presentations given over three consecutive sessions. The theme sessions covered groundwater and soil remediation using oxidation technologies, CO<sub>2</sub> sequestration, well and stream monitoring networks, bioremediation, stream and watershed hydrology, sustainable practices, and the Geology undergrad Creative Inquiry projects.

**Scott Brame** was, as in the past years, the main organizer and coordinator of this event.

### Hydrogeology Symposium, cont.



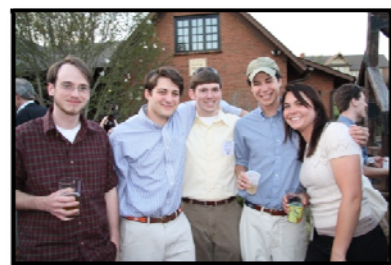
Jack Garihan and Bill Ranson of Furman explaining the geology of Glassy Mountain

**Dr. Larry Murdoch** gave a talk on Hydromechanics, **Dr. Shelie Miller** talked about Life Cycle Analysis, and **Drs. Ron Falta and Jim Castle** gave presentations relating to CO<sub>2</sub> sequestration. Graduate students giving oral presentations included **Dave Hisz, Richie Hall, Dan Matz, Seth Shantz, Shannon Thompson, Curtis Gebhard, Jim Chambelain, Xialong Lui, Fei Chen, Vijay Santikari, Adam Mangel, and Zuolin Liu.** **Na Hai** presented a poster. A complete list of presenters and the titles of their talks can be found at:

<http://www.ces.clemson.edu/hydro/symposium/speaksched.htm>

In addition to the posters, 28 exhibitors from around the southeastern United States as well as from New Jersey and Wisconsin had booths.

After the symposium, a mixer was held at the Geology Museum. The field trips were led by Jack Garihan and Bill Ranson of Furman University and Cameron Warlick of HydroSource, Greenville, South Carolina. Professors Garihan and Ranson have been dutifully mapping the geology of the upstate of South Carolina for over 20 years and graciously agreed to share their insights with us. Cameron graduated with a Masters in Hydrogeology from Clemson in 2004 and presented his ongoing efforts to provide groundwater to the Cliffs at Glassy development.



Graduate students Seth Shantz (far left) Kyle McGargle, Cory Noble, and Jimmy Mack at the Geology Museum for the post Symposium Mixer.

**Jan Young** has a new grand-daughter, **Hollyn Marie Griffin** born April 2<sup>nd</sup>. She weighed 7 lbs.13 oz. and was 20 ½ in. Jan also has a grandson, Hunter, age 5.



The department is saddened by the news that **Beverly Ray Buzzell** passed away on April 17<sup>th</sup> in Lexington, South Carolina. Beverly worked for the department manning the front desk from June of 2000 until June of 2001.

The department was also saddened to hear about the death of **Harvey Ludwig**. **Dr. Ludwig** was instrumental in bringing to Clemson thousands of research and training grant dollars in 1960s for the support of Clemson's fledgling Environmental Engineering program through his Public Health Service in Washington. Such support was greatly appreciated by Clemson which awarded him with an honorary doctorate in the late sixties. Also, not to be forgotten is the fact that he convinced five professors that they should have an organization separate from the existing one which was only a Section of the American Society of Engineering Education, hence the formation of the Academy of Environmental Engineering Professors.



**Dr. Brian Powell** and Yuji Arai will lead a \$1.18 M three year project entitled “Development of a Self-Consistent Model of Plutonium Sorption: Quantification of Sorption Enthalpy and Ligand-Promoted Dissolution” that was recently (this week) selected for funding by the DOE Office of Science, Biological and Environmental Research Program. The external collaborators are Dan Kaplan from SRNL and Udo Becker and Rod Ewing from the University of Michigan.

The project will focus on development of a mechanistic model of plutonium reactions at solid-water interfaces. The model will be a thermodynamic surface complexation model of plutonium sorption to mineral surfaces that is self-consistent with macroscopic batch sorption data, X-ray absorption spectroscopy (XAS) data, electron microscopy analyses, and quantum mechanical calculations.

**Dr. Powell** gave an invited lecture titled “Development and testing of conceptual models describing plutonium subsurface transport” at the Fall American Geophysical Union meeting in San Francisco, CA.

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The research being conducted related to Plutonium movement in soils and uptake by plant roots is generating a lot of interest within the DOE. This research is being performed in cooperation with the Savannah River National Lab (SRNL), the Lawrence Berkeley National Lab (LBNL) and the Pacific Northwest National Laboratory (PNNL). **Shannon Thompson** is just finishing his Ph.D. work on plutonium uptake by corn plants. The research related to this and other on-going work by **Dr. Brian Powell** is expanding, and Brian is assuming a leading role. In fact, Brian (Project PI) and **Dr. Fred Molz** just received a new contract with SRNL dealing with an expanded research effort relating to radionuclide geochemistry in wetland and subsurface sediments. Part of this project is also devoted to helping the SRNL initiate expanded, in-house, field studies at the Savannah River Site.

**Dr. Fred Molz's** existing project due to end this July will be submitted for a 3-year renewal. This project funded **Inci Demirkanli** and **Shannon Thompson**.

In recognition of Clemson's achievements and increasing expertise, **Dr. Molz** has been appointed to a DOE National Panel charged with providing a mid-term review of the DOE Integrated Field Research Challenge (IFRC). The IFRC is comprised of three large 5-year awards for multidisciplinary field-scale research at the 300 Area of the Hanford Site in Washington state, the Y-12 National Security Complex in Oak Ridge, Tennessee and at a former uranium mill tailings site in Rifle, Colorado. These are large research projects (\$3 million/yr; numerous researchers) charged with advancing the understanding of key processes that influence the mobility of contaminants in the subsurface. The Panel will assess the progress of these projects after 3 years of research and then evaluate their remaining plans.

**Dr. David Freedman** received a grant from the NSF-SBIR program. He is working as a subcontractor to Bioremediation Consulting, Inc. (Watertown, MA) on a project entitled "Development and Characterization of a Bioaugmentation Culture to Remediate Chlorinated Ethenes in Low pH Ground Water." Michael Hickey is the graduate research assistant working on the project.

**Dr. David Freedman** is also starting a project sponsored by Olin Corporation entitled "Laboratory Evaluation of Bioremediation for Groundwater at the Lake Charles Site." Han Wang is the graduate student working on the project.

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Clemson has received a gift of \$10,000 from the Brown Foundation for the express purpose of supporting (1) geology undergraduate creative inquiry and (2) geoscience field courses (GEOL 370 and GEOL 375). This is the culmination of **Dr. Richard Warner's** efforts working through the Clemson Development Office (with Ann Marie Alexander). The gift will be split evenly (\$5,000 each) between the two projects

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**Dr. Tanju Karanfil** gave an invited presentation "UV 254 Analysis: Recommended Procedures and Guidelines," at the 20<sup>th</sup> Annual South Carolina Environmental Conference, March 13-17, 2010.

**Darryl B. Jones**, former student of **Dr. Karanfil**, presented a Web cast on his Master thesis project "Iodo-Trihalomethane Formation from Pre-oxidation and Chloramination of Waters Containing Bromide and Iodide," for the American Water Works Association on April 7, 2010. The co-authors of the paper were **A. Saglam, A. Triger, H. Song, and T. Karanfil**.

**Dr. Karanfil's** group will collaborate on a research project "Coagulation-Ceramic Membrane Filtration Process for US Surface Water Treatment: the Effects of Coagulation and Membrane Fouling," with Dr. Jaehong Kim of Georgia Tech. and James Amburgey of the University of North Carolina in Charlotte. The project is funded by the Water Research Foundation.

**Dr. Karanfil** and **Daniel Lewis**, new graduate student of EEES, are starting a project to investigate iron and manganese problems at the SJWD Water District reservoirs and water treatment plant.

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**Dr. Stephen Moysey** is being awarded two new grants from the Department of Defense to improve landmine detection using ground-penetrating radar (GPR). The detection of abandoned landmines is a globally important humanitarian issue as they cause displacement of refugees, reduce the availability of arable land, and are responsible for over 5000 civilian casualties per year in 90 countries. This project will allow the department to develop a new radar testing facility to investigate the GPR response to landmines and other subsurface targets under a variety of challenging environmental conditions.



**Dr. Cindy Lee** in her role as a member of the Environmental Engineering Committee of the Science Advisory Board of the US EPA participated in a public meeting concerning the effects of hydraulic fracturing on drinking water on April 7-8, 2010, in Washington, DC. The goal of the meeting was to provide advice on the EPA's Office of Research and Development (ORD) proposed approach to be used to frame the hydraulic fracturing study design and the areas that will be addressed by research relevant to hydraulic fracturing. The meeting was heavily attended by industry, advocacy groups, and the media because of the interest in development of natural gas resources through hydraulic fracturing.

## Mainstreaming Environment and Sustainability in Caribbean Universities (MESCA)

The first MESCA workshop, which was hosted by the United Nations Environment Programme (UNEP) and the University of the West Indies (UWI), Mona was held September 22-24, 2009, at the Mona Visitors' Lodge and Conference Centre, UWI, Mona, Jamaica. It was the result of an initiative by Drs. Marceline Collins-Figueroa, Lorna Down, The University of the West Indies (UWI, Mona) and **Rachael Williams (EE&S, Ph.D)**, University of Trinidad and Tobago (UTT) and inspired by the UNEP Decade of Education for Sustainable Development (DESD) programme on 'Mainstreaming Environment and Sustainability in African universities (MESA)'.

The workshop was attended by twenty seven participants, representing twelve universities in the Caribbean region, including Haiti. The team was led by Prof. Akpezi Ogbuigwe (Head, Environmental Education and Training Unit, UNEP, Kenya), Ms. Isabel Martinez (UNEP-Regional Office for Latin America & the Caribbean [ROLAC]), Prof. Rosalyn McKeown (Portland State University, Oregon, USA), Prof. Gitile Naituli (Kenya) and Mr. Bill Godfrey (Enviroic Foundation International, USA).



The overall aim of MESCA is to start a movement at the participating universities where Education for Sustainable Development (ESD) issues will be part of all programs over the next 5 years. This will involve an action plan for mainstreaming UNEP thematic areas, in particular: climate change, disasters and conflicts and environmental governance into a wide range of disciplines in Caribbean universities. This will be in academic and non-academic areas of the universities.

**Tony Danko (EE&S, Ph.D)** has moved to the University of Porto as a Research Assistant. Tony and his wife, former EE&S student Christine Carvalo (Kika) have a new addition to their family, Alexandra, born in December.

**Leo Gumapas (EE&S, MS)** is working at the South Carolina Department of Health and Environmental Control as an Environmental Engineer for the Bureau of Air Quality in the Air Toxics Section, responsible for reviewing the compliance status for pulp and paper industries, plywood manufacturing plants, and batch chemical facilities. There are a total of approximately 40 facilities in the state of South Carolina.

Leo is married to Xiaoyan and they have a daughter, Alexis.



**John Sivey (EE&S, MS)** was selected to receive a 2010 C. Ellen Gonter Environmental Chemistry Award (formerly the Graduate Student Paper Award), the highest award given by the ACS Division of Environmental Chemistry. The paper that John's award nomination was based on was recently accepted for publication in ES&T, "Chlorine monoxide (Cl<sub>2</sub>O) and molecular chlorine (Cl<sub>2</sub>) as active chlorinating agents in reactions of dimethenamid with free aqueous chlorine".

"I credit my strong environmental chemistry foundation at Clemson for helping to make all this possible".

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*The next issue will be published in September 2010.  
Please send your submissions for your activities during Summer to  
Jan Young (ej@clemson.edu) by August 20, 2010.  
(Please do not forget to take pictures).*

**THANK YOU!**