



GEOGRAM



Fall 2012



GEOGRAPHY, GEOLOGY, METEOROLOGY, GIS

A LEADING AMERICAN UNIVERSITY WITH INTERNATIONAL REACH

The Annual Newsletter of the Department of Geography and Geology at Western Kentucky University

Dear Friends,

The Department of Geography and Geology enjoyed another extremely productive academic year in 2011-2012. Highlights of the year's accomplishments included the following events and activities:

► Drs Rezaul Mahmood and Xingang Fan spent much of the summer in China to develop research opportunities with colleagues at several research centers.

► Dr Josh Durkee's annual summer "Field Methods in Weather Analysis and Forecasting" (severe storm chasing) class had another outstanding educational experience across the Great Plains.

► Geography, Geology, GIS, and Meteorology students received multiple awards at several annual local and regional conferences.

► The Kentucky Mesonet reached 62 active stations across the Commonwealth (kymesonet.org).

► State climatologist Dr Stuart Foster, director of the Kentucky Climate Center and the Kentucky Mesonet at WKU, was appointed president of the American Association of State Climatologists

► China's Ministry of Land and Resources has named hydrogeologist Dr Chris Groves a finalist for the 2012 People's Republic of China Friendship Award, that country's highest award honoring foreign experts working in China.

► Two GIS students received ESRI scholarships, the twelfth year in a row for the Department.



A Letter from the Department Head

► Dr David Keeling was named Editor for the Americas of the *Journal of Transport Geography*.

► The Reynolds Foundation generously donated funds to establish the Reynolds Geological Laboratory for advanced student research, thanks to Dr Mike May.

► Dr David Keeling has been appointed a University Distinguished Professor in recognition of his teaching, research, and service accomplishments

► A group of WKU geography and geology students participated in a fieldtrip winding through the Ozarks, including the Salem Plateau and the St. Francois Mountain area of southeastern Missouri, as part of a Spring 2012 course in Geomorphology taught by Dr Jason Polk.

► In March, the International Education Council hosted the first WKU Statewide Study Abroad Symposium

at the Knicely Conference Center, organized by Erin Greunke and Dr David Keeling.

► Sixteen WKU geology majors traveled to San Salvador Island, Bahamas, over the January 2012 Winter Term for a study abroad field course on the geology and natural history of the Bahamas islands. "The Geology of the Bahamas" course was led by Dr Fred Siewers.

► Students and faculty from WKU's Department of Geography and Geology attended the annual meeting of the Geological Society of America (GSA) (Oct. 9-12) in Minneapolis.

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Faculty and students excelled again in scholarship, research, and professional development, convening and/or participating in myriad professional workshops and presenting about 60 papers at local, regional, national, and international conferences. Faculty also engaged significantly with the local community, continuing to serve on committees and task forces, participating in WKU-sponsored community outreach events such as the *Far Away Places* series at Barnes and Noble, sharing geoscience expertise on WKYU-FM's Midday Edition program, and giving talks at schools, churches, community organizations, and for service groups.

Faculty served as editors or co-editors of professional academic journals or book series, eight faculty reviewed manuscripts for academic journals or publishers, and geography and geology faculty research articles appeared in such diverse journals as: *Tourism Geographies*; *BAMS*; *Geographical Review*; *Science*; *Material Culture*; *Inorganic Chemistry*; *Water, Air, & Pollution*; and *Applied Geography*, among others. Approximately thirty faculty research articles or book chapters are either currently in review, revision, or awaiting publication, several co-authored with undergraduate or graduate students, an exceptional level of productivity indeed.

In May 2012, the Department recorded 127 majors in geography, meteorology, and GIS; 68 in geology; and 92 total minors. The Department graduated 44 students from its major programs during the year and it has a target of 50 new majors each year to maintain and grow the programs. Thirty six graduate students are currently enrolled in the MS Geoscience program.

The students, staff, and faculty of the Department of Geography and Geology again have recorded many outstanding achievements this past year. We have each and every one of you to thank for helping to build the Department into what it has become--the best in the state and one of the very best in the nation. We look forward to hearing from you this coming year.

Best Wishes,

David J. Keeling
Department Head

*** HOMECOMING ***

Saturday, October 20, 2012

**** Special Event: Homecoming Tailgating
Time: 11 a.m. - 2 p.m.**

Location: TBA - Join us at the *Ogden College tent and look for the Geography and Geology faculty and banner.*

(Note: Because of DUC construction this year, space for tents is limited, so look for us with the other academic tents.)

Enjoy good food and old friends. Meet the departmental faculty and current students.

Visit <http://www.wku.edu/geoweb/>

The Department website homepage sports a new look, following the university wide revision of all website templates. There is always fresh material, new links, updated pictures, and more information about programs. In addition, the Geology and GIS programs have their own websites with information about the major options, faculty research, student opportunities, and other information. GIS Director Kevin Cary and AMI Director Dr Aaron Celestian are the webmasters respectively and you can view pages at <http://www.wku.edu/gis/> and www.wku.edu/geology.

Archived information about the Department's news announcements (by month and by year) and other publicity can be found on the website at <http://www.wku.edu/geoweb/newsarchive.php>. Also, there are links to news reports archived by calendar year. Visitors to the website can also view details of faculty and student publications. Just go to <http://www.wku.edu/geoweb/facpubs.php> and you will find recent publications listed alphabetically by faculty, with a link to another page that lists faculty publications by rank. There is also a link to the student theses and other publications page, where you can see the breadth and depth of student research activities.

We love to receive updates from our alumni! Please take the time to fill out the alumni update form attached to this GEOGRAM or send the department head an email (david.keeling@wku.edu) with details.

Outstanding Geography and Geology Students, 2011-12

The Department of Geography and Geology takes pride every year in the quality of its graduating seniors and, each year, the Department recognizes its outstanding seniors at a public presentation by presenting them with awards and certificates. Recipients of the Department's highest honors also receive recognition at the annual Ogden College Awards Ceremony.

For the 2011-12 academic year, Melissa Cary received the Outstanding Geoscience Graduate Award, presented by Dr Peggy Gripshover. Shelby Rader received the Judson Roy Griffin Outstanding Senior in Geology Award. Scarlett Marklin received the Ronald R. Dilamarter Outstanding Senior in Geography Award. Lee Campbell received the L. Michael Trapasso Outstanding Senior in Meteorology Award, presented by Dr Josh Durkee and Dr Trapasso. Dustin Horn received the second annual award for Outstanding Graduating Senior in GIS, presented by Kevin Cary.

Other awards included scholarship recognition, service awards, and research awards.



Lee Campbell received the L. Michael Trapasso Award for Outstanding Meteorology Major from Dr Trapasso (left) and Dr Durkee (right)



Melissa Cary received the Outstanding Geoscience Graduate Award from Dr Peggy Gripshover (left)



Dustin Horn received the Outstanding GIS student award from Kevin Cary (left), GIS Center Director

**Congratulations to ALL
our Outstanding Students!**



Dr Foster Appointed AASC President

State climatologist Dr Stuart Foster, director of the Kentucky Climate Center and the Kentucky Mesonet at WKU, is the new president of the American Association of State Climatologists. Dr Foster began his two-year term at the conclusion of the AASC's 37th annual meeting earlier this year in Destin, Fla. "It is a very distinct honor for me to serve people I hold in high esteem," he said. "I'm very honored to have the opportunity and will do the best job I can. The experience I've had as state climatologist and in helping build the Kentucky Mesonet has been valuable and has helped prepare me for this opportunity. "I grew up in a family in which I saw my grandparents and parents, specifically my grandfather and father, being very active in public service. This is my way to carry that torch and follow the example set for me."



Dr Foster's position as president of the professional scientific organization also "reflects the ongoing evolution and prominence of WKU in the area of meteorology and climatology," he said. The Kentucky Climate Center was established in 1978 and is one of the oldest climate offices in the United States; the Kentucky Mesonet is one of two such world-class automated weather and climate observing systems in existence; Dr Rezaul Mahmood, associate director of the Kentucky Climate Center and Kentucky Mesonet, is serving on the National Climate Assessment Development and Advisory Committee; and other faculty members and students actively engage in meteorological and climatological research and outreach. "We've built a center of excellence at WKU and this further enhances our national reputation in this area," Dr. Foster said. "It's important that we have a leadership role in Kentucky and are recognized beyond our borders. We take pride in that."

Department Head Dr David Keeling agreed. "Dr. Foster's appointment to the AASC presidency is na-

tional recognition not only of his outstanding contributions to the scientific community but also of the growing national status of WKU's climate programs and services," Dr. Keeling said. "As the Climate Center and the Mesonet continue to make valuable contributions to the wider Kentucky community, Dr. Foster's work with the AASC will further enhance WKU's reputation as a leading American university with international reach."

The AASC promotes cooperation between state climatologists, the National Climatic Data Center, the regional climate centers, and other federal, state, and private agencies on matters related to climate. "Weather and climate affect people, communities and the economy on a daily basis," he said. "It's easy to see right now with drought in Kentucky, including the western part of the state in record drought conditions while last year we had extreme precipitation and flooding in some of those same areas. There's no need to debate that climate is an important topic."

In addition to weather and climate issues, Dr Foster expects to focus on two issues as AASC president – re-examining the certification process for state climate offices and developing a strategy that will enable the organization to hire an executive director for the organization, strengthen federal partnerships and provide an enhanced level of service to its members. "The AASC is an organization that is dedicated to providing services down to the local level and to individual states," he said. "Our members take pride in being recognized as a trusted local authority on climate-related issues."

Hoffman Scientists Visit Southwest China to Conduct Karst Water Resource Training

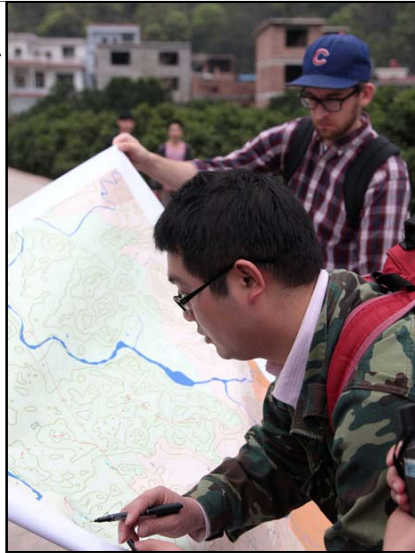
Two scientists from WKU's China Environmental Health Project (CEHP) traveled to rural southwest China in April, where they trained government scientists in techniques for understanding and protecting karst water resources. Sean Vanderhoff of Louisville, a recent graduate of the M.S. Geoscience program, joined Dr Chris Groves, CEHP and Hoffman Institute director, traveling to the Institute of Karst Geology

(IKG) in Guilin. There they gave lectures and participated in fieldwork describing specialized methods of underground water tracing to support both water resource protection and joint U.S./China efforts to measure aspects of the global carbon cycle.

The Institute of Karst Geology is China’s premier karst research facility and operates under the auspices of the Ministry of Land and Resources. Much of its work is focused on understanding and finding solutions to water supply and quality problems in China’s karst regions, which impact tens of millions of mostly rural people. The China Environmental Health Project, a program of WKU’s Hoffman Environmental Research Institute, works to develop partnerships in China and internationally to enhance China’s academic capacity building in environmental health and resource protection. Through 30 WKU trips to China since 1995, and supported by numerous visits of Chinese scientists to WKU, the joint teams have set up laboratories, implemented training seminars and fieldwork for scientists and government officials, and published papers in scientific journals. Most of this work has been under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The pair gave several lectures and conducted fieldwork in the Maocun Groundwater Basin near Guilin, which is a sister research site with Lost River Cave in Bowling Green. Vanderhoff also visited Southwest University in Chongqing to evaluate conditions at a groundwater tracing laboratory there established by CEHP in 2007, and he also gave several more lectures to about 50 scientists and graduate students. “This was the perfect opportunity for Sean to use the experience he developed as a graduate student at WKU to help our Chinese colleagues develop new skills in groundwater protection,” Groves said. “The same technology is also providing direct benefits to China’s serious efforts to quantify CO2 budgeting and how it is impacting climate change.”

The trip and related efforts were supported by matching grants from the Chinese government and WKU’s Office of Research through its Research and Creative Activity (RCAP) Program.



Sean Vanderhoff (upper right) works with Chinese geologists and local villagers to identify groundwater monitoring points in northern Guangxi’s remote Zhang Jia Village.

Leading Journals Publish Research by Department Faculty and Students

A central mission of student engagement in the Geography and Geology Department is to engage students in faculty-supervised research that leads to publication. This past year, faculty and students in our various programs, as well as alumni, have been very successful in bringing collaborative research to publication in leading national and international journals.

Undergraduate Meteorology majors Lee Campbell of Paducah, Kyle Berry of Mount Washington and Dustin Jordan of Seymour, Tenn., worked with Drs Josh Durkee, Greg Goodrich, Stuart Foster and Rezaul Mahmood, on research that addressed the record May 2010 regional rain and flood event. Their paper has been published in one of the country’s leading climate journals, the *Bulletin of the American Meteorological Society*.

Ronnie Leeper of Asheville, N.C., who earned his M.S. degree in Geoscience in 2009, had a paper titled “Influence of Karst Landscapes On Planetary Boundary Layer Atmosphere: A Weather Research and Forecasting (WRF) Model-based Investigation,” co-authored with Dr Rezaul Mahmood, published in the *Journal of Hydrometeorology*. Leeper is working at the National Climatic Data Center in North Carolina. Ashley Littell of Louisville, who earned her M.S. in Geoscience in 2007, had a paper titled “Observed Data-based Assessment of Relationships among Soil

Moisture at Various Depths, Precipitation, and Temperature,” co-authored with Dr Rezaul Mahmood and two other collaborators, published in the journal, *Applied Geography*. She works for Connected Nation in Louisville.

Astrid Gonzalez of State College, PA., who earned her B.S. degree in Meteorology in 2010 and participated in the National Science Foundation’s Research Experience for Undergraduates while at WKU, is the lead author with three collaborators on an article titled “Comparison of Ensemble Kalman Filter-based forecasts to traditional ensemble and deterministic forecasts for a case study of banded snow” that appeared in the journal *Weather and Forecasting* in early 2012. She is enrolled in the geography graduate program at Penn State.

Anthony Bedel of Athens, GA., who earned his B.S. degree in Meteorology in 2010 and is enrolled in the geography graduate program at the University of Georgia, is a co-author on a paper titled “Predicting the Seasonal Shift in Mosquito Populations Preceding the Onset of the West Nile Virus in Central Illinois” published in the September 2011 issue of the *Bulletin of the American Meteorological Society*.

Ann Epperson of Nashville, Tenn., and Matt Brunt of Bowling Green, who earned their M.S. degree in Geoscience in 2010 and 2009 respectively, along with co-author Dr Katie Algeo, published “Historical GIS as a Platform for Public Memory at Mammoth Cave National Park” in the Fall 2011 issue of the *International Journal of Applied Geospatial Research*. Brunt works as a GIS Analyst for Connected Nation, and Epperson works for the Tennessee Department of Transportation. Melissa Hendrikson of Vernal, Utah, who earned her M.S. in Geoscience in 2006, published “From sink to resurgence: the buffering capacity of a cave system in the Tongass National Forest, USA,” with co-author Dr Chris Groves, in the Fall 2011 issue of *Acta Carsologica*. She works for the Ashley National Forest in Utah.

Other recent peer-reviewed publications by faculty and students include:

- Dr Katie Algeo, with co-authors (2011). Nationalism in Geography Classrooms: Challenges and Opportunities. *Journal of Geography* 110(4): 166-175.
- Dr. David Keeling (2011). Iconic Landscapes: The

Lyrical Links of Songs and Cities. *FOCUS on Geography* 54(4): 113-125.

- Dr Rezaul Mahmood with co-authors (2012). Land use/land cover changes and climate: Modeling analysis and observational evidence. *WIREs: Climate Change* 2(6): 828-850.
- Drs Leslie North and Jason Polk, with co-authors (2011). Application of a cave inventory system to stimulate development of management strategies: The case of west-central Florida. *Journal of Environmental Management* 92(10): 2547-2557.
- Kramer, S. (M.S. Geoscience 2011) and Celestian, A. (2012) Effects of hydration during strontium exchange into nanoporous hydrogen niobium titanium silicate. *Inorganic Chemistry* 55(11): 6251-6258.
- Gripshover, M., and T. Bell (2012) Patently Good Ideas: Innovations and Inventions in U.S. Onion Farming, 1883-1939. *Material Culture* 44 (1): 1-30.
- Yan, J, with co-authors (2011). Hydrochemical Variations of Epikarst Springs in Vertical Climate Zones: A case study in Jinpo Mountain National Nature Reserve of China. *Environmental Earth Sciences* 63(10): 375-381.

A full listing of current and recently published articles by faculty and students can be found on our website.



The Harbor Bridge in Sydney, Australia, from Keeling’s article on “Iconic Landscapes” that appears in *FOCUS on Geography*

Students, Faculty Attend Geological Society of America's Annual Meeting

Geology students and faculty attended the annual meeting of the Geological Society of America (GSA) convened October 9-12 in Minneapolis. The theme of the conference was *Archean to Anthropocene: The past is the key to the future*. Presentations included:

* *Understanding the Earth System through Field and Digital Mapping Techniques in the Mississippian and Pennsylvanian of Western Kentucky* by undergraduate geology majors Buddy Price of Dubre, Chris Driver of Hopkinsville and Marvin Conn of Lewisburg, with Dr Michael May.

* *Advances in Epikarst Zone Hydrogeology in the Pennyroyal Plateau of South-Central Kentucky: Implications for Contaminant Transport* by Dr Jason Polk (Hoffman Institute Associate Director), Dr Chris Groves (Distinguished Professor and Hoffman Institute Director), and geosciences students Benjamin Haaff of Rockport, Ind., Ben Miller of Bowling Green and Sean Vanderhoff of Bowling Green.

* *Multiple Storm Event Impacts on Epikarst Storage and Transport of Organic Soil Amendments in South-Central Kentucky* by graduate geoscience student Sean Vanderhoff of Bowling Green.

* *Portals in the Geology Curriculum for Undergraduate Research*, a poster by Drs Andrew Wulff, Michael May, Fred Siewers, and Aaron Celestian.

* *Ion Selectivity Studies on Nanoporous Crystal Structures*, a poster by undergraduate geology major Michael Powers of Bowling Green.

* *An Evolving Online Tool for the Assessment and Evaluation of Human-Environmental Interactions in Karst Landscapes* by REU undergraduate student Victoria Allen of Auburn, with Hoffman Institute faculty Drs Jason Polk, Leslie North, and Chris Groves, and geoscience graduate student Taylor Hutchison of Nashville, Tenn.

* *Misconceptions among us: Insights from Informal Karst Learning Environments* by Hoffman Institute associate Dr Leslie North.

Dr Fred Siewers led a group of 10 undergraduate geology majors to the conference as part of a for-credit geology enhancement course. At the conference, students attended paper sessions, explored post-graduate career opportunities and learned more about the professional side of the discipline.

“Student engagement in the Department of Geography and Geology is best exemplified by presentations of student research at conferences and workshops,” said Department Head Dr. David Keeling. “The opportunity to conduct research with faculty and fellow students in advanced geology classes or through supervised independent projects makes WKU students highly competitive when external opportunities become available, including graduate programs. Our geology students always receive high praise at these conferences for the sophistication and thoroughness of their research.”

Dr Nahid Gani Our Newest Faculty

Dr Nahid Gani from Tulane University, New Orleans, joined the Department this fall in a tenure-track, assistant professor of geology position. She received her doctorate degree from the University of Texas at Dallas with specializations in structure/tectonics, tectonic geomorphology, remote sensing, and GIS. After finishing her PhD, she served as a research assistant professor at the University of Utah and the University of New Orleans, and later joined Tulane University in a professor of practice position. During her stay at these universities, she developed teaching expertise in several areas, including structural geology, remote sensing, GIS, and physical geology. At WKU, she is currently teaching Tectonics and an honors section of The Earth.



Dr Gani collecting data from the Blue Nile Canyon on the Ethiopian Plateau

Dr Gani has an extensive international research experience in East Africa and, more recently, in the Nepal Himalayas. During her PhD research, she worked on the incision history and evolution of the Blue Nile Canyon on the uplifted Ethiopian Plateau through integration of remote sensing, GIS, and field studies. The plateau is characterized by the 1.6 km-deep Blue Nile canyon, a true rival of the Grand Canyon of North America, formed by the extensive incision of the Blue Nile River, a tributary of the world's longest river, the Nile. She found this research very rewarding and exciting because not only is the field area daunting yet breath-taking, but also the type of problem she is trying to solve forced her to work in an interdisciplinary manner. This is the research that boosts her geological spirit and made her passionate about how landscapes response to tectonics and/or climate.



Dr Gani herding her way to the field, Afar, Ethiopia

Using a concerted interdisciplinary approach of thermochronology, quantitative geomorphology, and paleoaltimetry involving field data and remote sensing-GIS data, she is exploring the precise timing and magnitude of uplift and associated incision of the Ethiopian Plateau. This information is critical in assessing how the dynamic, elevated landscape of East Africa controlled paleoclimate in the region and created a highly variable (both in space and time) physiography that acted as a perfect cradle for the evolution of our humanity. She is collaborating with colleagues

in Arizona State University, Brown University, the University of Chicago, and the University of New Orleans. This research has led to several publications in high-impact geology journals, including a recent one in *Nature Communication*.

Some of her other current research areas include the Nepal Himalayas and the Book Cliffs, Utah. In Nepal's Himalayas, she started to use detrital thermochronology to investigate Cenozoic climate-tectonic-incision coupling in relation to deformation history. This summer, Dr Gani, her collaborator, and one graduate student conducted a first season of field work in the Sub-Himalaya and Lesser Himalaya region to collect structural and sedimentological data, along with rock samples for thermochronological and stable-isotopic analyses. This is a collaborative project with the University of New Orleans and Brown University.

Dr Gani is also working on a collaborative project with the University of New Orleans, Imperial College London, and Bergen University (Norway) focusing on shallow-marine and fluvial outcrop reservoir analog-modeling in the world-famous sedimentary outcrops of Book Cliffs, Utah. In this project, she is particularly looking at 20-cm resolution helicopter-borne LIDAR data and supervising a Ph.D. student to reconstruct a 3D-outcrop model by mapping Cretaceous fluvial sandbodies from these LIDAR data. To the best of her knowledge, this is (one of) the first attempts at 3D mapping of fluvial channels in outcrops, which will allow the investigation, among others, of channel clustering and compensational stacking due to auto-genic avulsion in the rock record.

She is also using 3D Structural modeling to understand the dynamic nature of extensional faults in the Ethiopian Plateau evolution. The plateau is characterized by numerous crisscrossing normal faults related to pre- and post- East African rifting events. However, the dynamic behaviors of these faults are not well defined. Her goal is to investigate the deformational histories of these faults in the exhumation of the Ethiopian Plateau, as well as to understand the impact of mantle dynamics on the evolution of these faults. One of her approaches to addressing this issue is fault diffusion kinetic modeling from geomorphic analysis and field studies. To understand fault activities (active or inactive, seismic or aseismic) properly, it is critical to analyze the interaction of surface processes such as drainage patterns and their geomorphic parameters

with faults and their nature in overlapping fault zones. The East African Rift system is an ideal place to study the interaction of drainages and fault systems.



Dr Gani describing part of the Himalayan fold and thrust belt structure to a Ph.D. student during her June, 2012, fieldtrip in Nepal.

Now, here she is at WKU “with international reach” that opens up a promising opportunity to invigorate her current research with international focus. She hopes to bring more international recognition to the Geography and Geology department through her cutting-edge research, publications, and students’ participation in national and international meetings and conferences. Her expertise in geological remote sensing and GIS will add another dimension to the Department’s already well-developed GIS expertise and foster collaboration within the Department. One of the news media quotes highlighting her Ethiopian Plateau research involving remote sensing: “Gani and colleagues had to turn to outer space to determine that the geological processes that spurred on human evolution and led to the deep incision on the plateau lay deep within Earth’s mantle” (<http://www.geosociety.org/news/pr/07-41.htm>).

Since 2002, Dr Gani has been an active member of the American Geophysical Union, Geological Society of America, American Association of Petroleum Geologists, and the Association of Women Geoscientists. During her spare time, which is hard to come by, she enjoys painting, mostly oil on canvas. One of her oil paintings titled “Tectonic Hypothesis of Human Evolu-

tion” was exhibited in the first international geological art competition called “Geo sapiens, the fusion of Geology and Art.” Thus far, she has painted more than 20 oil paintings portraying various cultures, life, and abstract concepts. Besides, she loves traveling and, of course, enjoys spending time with her two young daughters Ariti (6 years) and Fia (18 months) and with her husband Royhan, who is also a geologist at the University of New Orleans. She is living in the fusion of geology and life, and is proud to become a Hilltopper. After all, in Bowling Green, this is the closest one can get to Mars by walking!

Dr Jennifer Cole Visiting Assistant Professor

Dr Jennifer Cole joins the Department as a Visiting Assistant Professor in the Fall of 2012. Dr Cole has been part-time faculty at WKU since 2009, teaching introductory and online courses in Geology and Anthropology. She received a B.A. in Anthropology from Rutgers University in 1997 and a Ph.D. from the Interdepartmental Doctoral Program in Anthropological Sciences at Stony Brook University in 2003. She conducted fieldwork in Kenya, Tanzania, and South Africa, as well as the Mojave region of California. Her doctoral research applied U-Pb dating to Cenozoic carbonates from lacustrine environments. In addition to geochronology, Dr Cole studies carbonate diagenesis and uranium incorporation into calcite using a variety of methods, including petrographic and cathodoluminescence microscopy, stable isotope geochemistry, micro-X-ray fluorescence spectroscopy (μ -XRF), and X-ray absorption near edge spectroscopy (XANES).

From 2003 to 2007, Dr Cole was at the Lamont-Doherty Earth Observatory at Columbia University, first as an Earth Institute Fellow, and then as a Columbia Science Fellow and Lecturer in the Department of Earth and Environmental Sciences. She remains Adjunct Associate Research Scientist at LDEO. Her research explored the response of NW Africa to glacial-interglacial climate change. Dr Cole used radiogenic isotopes and major and trace element geochemistry to study terrigenous sediments recovered from an ocean core drilled about 160 km off Cap Blanc, Mauritania.



The majority of these sediments were transported to the ocean as aeolian dust, and large changes in their chemical composition suggest a dynamic low-latitude terrestrial response to high-latitude climate forcings. Her educational activities included helping to develop and teach the new science Core Curriculum course “Frontiers of Science,” required of all incoming Columbia College students. The course exposed students to the latest research and findings in a variety of fields, including astrophysics, nanotechnology, climate change, ecology, and neuroscience. More importantly, it helped students develop ‘scientific habits of mind,’ increasing their scientific literacy and ability to construct informed opinions concerning a variety of scientific matters.

In the 2012-2013 academic year, Dr Cole will teach classes in the Department and in Folk Studies and Anthropology. She will develop two courses in collaboration with the WKU Honors College and the Department of Biology. “Small, Hot, and Crowded:

Climate and Society” will focus on the climate system, Earth’s paleoclimate records, evidence for modern warming, and predicted impacts to humans and ecosystems. “How to Build a Habitable Planet” will start with the Big Bang and end with 7+ billion people on planet Earth. Students will work through what it takes to design and maintain a planet that supports life, and allows for human societies to thrive. She will also continue her research in geochronology and paleoclimate, focusing particularly on time periods and locations relevant to human evolution.

When she has time, Dr Cole enjoys cooking, knitting, and reading novels. A native of coastal New Jersey, she sometimes longs for the beach and Pine Barrens. Dr Cole is married to Dr Celestian, and together they have two sons, Alexander (5) and Oliver (2). Xander and Oliver are regularly dragged around the country by their parents to camp, hike, and look for interesting geological features. Drs Cole and Celestian are fairly certain their kids will not become geologists.

KARST FIELD STUDIES SUMMER PROGRAM

The Hoffman Environmental Research Institute through its Center for Cave and Karst Studies and in cooperation with the Mammoth Cave International Center for Science and Learning and Western Kentucky University, offers a series of week-long field courses focusing on cave and karst science, and caving. The WKU/Mammoth Cave National Park Karst Field Studies Program had a highly successful summer 2012 program, with 42 students participating in 5 different field courses (<http://karstfieldstudies.com/>).

The summer cave and karst courses are for those with an academic, professional, or personal interest in all aspects of caves and karst systems. An adventurous spirit and good physical conditioning will maximize enjoyment and benefits of the courses. Past participants have included undergraduate and graduate students, teachers, college professors, cave guides and interpretive staff, cave and karst managers, geologists, hydrologists, and cavers. Individuals desiring an exciting and educational vacation experience can also benefit from participating in a course. Some courses do require previous subject knowledge, but others are designed for individuals who are purely interested in caves, caving, and karst.

The courses offered through the program vary from year-to-year and sometimes in location, but all provide hands-on field experiences. Though many of the courses are held at Mammoth Cave National Park, other locations include the urban karst of Bowling Green, Kentucky; Edwards Aquifer in San Antonio Texas; Missouri Ozarks; and Sequoia Kings Canyon National Park, California. Many of the courses even involve rigorous trips into rarely visited portions of Mammoth Cave. See the courses tab for more information on this year's course offerings and locations.

Typical course format consists of instructors lecturing in the mornings with cave and surface trips scheduled for the afternoons. Special talks, slide shows, and trips into area caves may also be scheduled after dinner. Courses can be taken for academic credit (undergraduate and graduate), for continuing education credits (CEU), or as non-credit workshops.

HOFFMAN CARIBBEAN INITIATIVE

During 2012 the faculty of the Hoffman Institute hosted a collaborative planning visit for officials from the Caribbean Community Climate Change Centre, the principal advisory agency for climate science and policy for CARICOM and other countries of the Caribbean region.

David Keeling appointed as University Distinguished Professor of Geography

Dr David Keeling, an internationally renowned expert on Argentina and global transportation issues, has been appointed a University Distinguished Professor at WKU. Dr Keeling is a professor of geography and has served as the head of the Department of Geography and Geology since July 2001. WKU's Board of Regents approved the appointment on July 27.



On the Trans Siberian Railway, standing at the dividing point between Asia and Europe in Russia.

"I am honored by the appointment," Dr Keeling said. "I have been involved in myriad projects around the world, but without the support of my colleagues and our students all working together, this recognition would not have happened." Dr Keeling has taken students on many study abroad programs to destinations across the planet such as Argentina, Australia, Tanzania, Mexico, Ecuador, Chile, United Kingdom, Turkey, Italy, Greece and France, among other locales, since 1994. For the past 15 years, Dr Keeling has worked with the American Geographical Society as an

expedition lecturer and has had the good fortune to visit over 100 countries on these expeditions. Since 2000, Dr Keeling has served on the Board of Councilors for the Society, and he currently serves as the Editor for the Americas for the *Journal of Transport Geography*. Dr Keeling, who joined the WKU faculty in 1993, received his undergraduate degree in business from North Sydney College, and his M.S. and Ph.D. degrees in geography from the University of Oregon. He has published numerous papers, book chapters, and books; presented at more than 100 international, national, and regional conferences; and given more than 100 seminars and public talks around the world.

He joins Dr Chris Groves, Dr Ken Kuehn, and Dr Nick Crawford from the Department who have also received this recognition in the past.

Research Journal Honors WKU Project on Mammoth Cave as Homeplace

A WKU research project about the pre-park residents and communities near Mammoth Cave National Park has been selected as the 2011 Best Paper Award by the *International Journal of Applied Geospatial Research*. "Historical GIS as a Platform for Public Memory at Mammoth Cave National Park" was written by Dr Katie Algeo, associate professor of geography in WKU's Department of Geography and Geology, and graduate students Ann Epperson and Matthew Brunt.

Dr Algeo, a cultural/historical geographer who joined the WKU faculty in 2001, has focused much of her research in recent years on the cultural geography of Mammoth Cave. The Mammoth Cave Historical GIS (Geographic Information Science) project is dedicated to document and preserve the lives and memories of the area's pre-park residents. "Mammoth Cave is one of a handful of national parks that were formed from private lands. Thirty communities and 700 farms covered the landscape – people lived here, worked here and died here," Mammoth Cave National Park Superintendent Patrick H. Reed said. "Dr Algeo's project pulls together information that paints a picture of Mammoth Cave as their homeplace."

Read more about the project online at: <http://mammothhgis.yolasite.com/> and experience the historical GIS at <http://161.6.109.206/mammothHGIS/>

Article abstract: The Mammoth Cave Historical GIS (MCHGIS) fosters new understandings of a national park landscape as a historic farming community and offers a web-based platform for public memory of pre-park inhabitants. It maps the 1920 manuscript census at the household level over a streaming topographic map and georeferences Civilian Conservation Corps photographs of dwellings for visualization and analysis of the area's population on the eve of creation of Mammoth Cave National Park. A web interface to the MCHGIS permits broader dissemination of archival holdings. Public participation GIS techniques are adapted to initiate a virtual site of public memory to supplement the history presented by institutionally-held materials with those donated from private holdings.



Department of
Geography and Geology

Designed by Hoffman Institute staff member Jonathan Oglesby

Back issues of GEOGRAM online

Visit <http://www.wku.edu/geoweb/geogram.php> to view previous issues of the GEOGRAM alumni newsletter.

ADVENTURES IN GEOSCIENCE

Climatic Effects of Afforestation in China – An International Collaboration

Drs Xingang Fan and Rezaul Mahmood were invited to, and subsequently visited, the Key Laboratory of Regional Climate-Environment Research for Temperate East Asia (RCE-TEA), Institute of Atmospheric Physics (IAP), Chinese Academy of Sciences (CAS), over the summer 2012. The collaboration was productive, from which five journal papers are under preparation. Continuing collaboration is the goal, with funding from the Chinese Natural Science Foundation on a collaborative research project on land-use and land-cover impacts on regional climate and hydrology.

This collaborative effort started in 2010 when Dr Fan hosted a Ph.D. candidate, now Dr Liang Chen, an employee of RCE-TEA, for a one-year visit to work on a NASA grant. A further significant step was taken in summer 2011 when Dr Fan hosted Dr Zhuguo Ma, Director of the RCE-TEA, for a one-month visit. Based on the fruitful discussions between Drs Ma and Chen and faculty in our department, collaborative study on mutually interesting areas was developed. After Dr Ma's return to his institution, communication and discussions continued, leading to a one-month visit to RCE-TEA by Dr Mahmood in May 2012, followed by another one-month visit by Dr Fan in June 2012. Both visits were hosted by Dr Ma at RCE-TEA/IAP. Drs Mahmood and Fan worked with a group of scientists at RCE-TEA, including professors, post-docs, and Ph.D. students on various projects. This arrangement maximized the possible collaboration time between the two groups for best outcomes.

Among the various research projects being carried out, two produced quick turnaround results. Dr Mahmood worked closely with Drs Chen and Ma on an examination of model sensitivities to three different land-cover datasets. A journal manuscript, titled "Recent land-cover changes and sensitivities of model simulations to various land-cover datasets in China", has been drafted and is undergoing final polishing for publication.

While he kept Dr Chen's work moving forward, Dr Fan worked with another Ph.D. candidate, Ms. Qing Yang, a newly recruited graduate student, Ms. Yunhuan Han, and Dr Ma on land-cover changes over the Loess Plateau resulting from China's afforestation policy and its impacts on regional climate. A journal manuscript, titled "Land use/land cover and regional climate changes over the semi-arid Loess Plateau during 2001-2009", has been drafted and is undergoing editing for publication.

Our research found that the land-cover changes from human afforestation activities aimed at developing a sustainable ecosystem have been documented by both statistical data from the government and satellite observations. The effect of the afforestation in land-cover change is proven to have upgraded the vegetation canopy. The corresponding regional climate change is under investigation in an attempt to attribute the natural and human-induced changes. A modeling study will be an important component in this regard.



Dr Fan at the Great Wall in China

Journey to Vietnam and Some Really Big Caves

By Chris Groves

On the way home from a visit to Guilin, China, last summer, Deana and I, with our daughters Leah and Lillian, visited Vietnam to have an opportunity to explore the remote Phong Nha-Ke Bang National Park and UNESCO World Heritage Site on the Vietnam-Laos border. In 2009 what are so far the largest known cave passages in the world were discovered here in Sơn Đoòng Cave, featured not long ago in *National Geographic*. While that cave is still relatively difficult to access, several other large caves are accessible in the park by car or boat.

annihilation in the 1960s and 70s from both the air and sea.

During our few days there we visited Phong Nha Cave and Thiên Đường (Paradise) Cave. The latter was only discovered in 2005 in the thick jungle, and has been explored to a length of 31 km, with passages that in places reach 150 meters wide and 100 meters tall, along with a tour featuring 2,000 steps. The pictures below show some scenes of this beautiful region above and below ground.



Map of Vietnam showing Phong Nha-Ke Bang National Park



Karst towers at the entrance to the park. This road was made famous as the Ho Chi Minh Trail during the Vietnam War.

In Hanoi we met Dr Vu Nguyet, a karst expert at Vietnam's Institute of Geosciences and Mineral Resources, who some will remember from her year-long research visit to WKU and the Hoffman Institute a few years ago. After a day there we jumped on the overnight sleeper train and headed down the east coast to Dong Hoi, a beautiful beach town on the South China Sea. The town serves as the jumping off point for Phong Nha-Ke Bang National Park. The whole area is spectacular, but sadly, with a location just a few kilometers north of the Vietnam War's so-called Demilitarized Zone, the entire region was bombed to



After a several km boat trip along the Son River, boats enter the mouth of Phong Nha Cave and continue about a kilometer into the cave.



Vietnamese karst scientist Vu Nguyet and Leah Groves on a beach of the South China Sea near the town of Dong Hoi.

A DEATH-DEFYING BORDER CROSSING

By Dr Michael Trapasso

The year is 1860, and some of our Southern States are threatening to ‘Secede from the Union’ if that trouble-maker from Illinois, Abraham Lincoln, is elected. Our Country is in political turmoil. Meanwhile, in Niagara Falls, New York, two daredevils compete for fame and fortune on a high wire traversing the Niagara Gorge. One year earlier, a muscular French acrobat named Jean Francois Gravelet (stage name, Blondin) walked across the Gorge on a tight rope made of manila to a crowd of 25,000 spectators. Later “the Great Farini” (a.k.a. William Hunt) would challenge Blondin’s ownership of the high wire, and the great competition began.

All through the summer of 1860, they would outdo each other with ever more elaborate tightrope stunts. I mean these guys were crazy. One rode a bicycle along the wire to Canada, while the other walked across it carrying his manager on his back. One walked out, balanced a small stove on the wire, cooked an omelet, and ate his lunch. Then the other balanced a small clothes washer, sent a bucket down to the river to fetch water, and then proceeded to do his laundry. I’m not kidding, these guys were nuts! Altogether more than a dozen tightrope walkers would try to recapture the magic of 1860. The madness seemed to end around 1887, only to pick up some 14-years later with the first barrel ride over the Niagara Falls.¹

Stories of daredevils braving the Niagara River and Gorge were ingrained in my youth. We even learned about these death-defying feats in 7th Grade Social Studies class. And now, someone was going to try it again? Is he insane? Now don’t get me wrong, I don’t go traipsing around the globe to witness daredevil stunts. Evil Knievel, for example, never held interest for me; I didn’t care for him or his motorcycle. But this stunt is going to take place in my hometown. The State Parks around the Niagara Gorge introduced my earliest memories of a river, a falls, a gorge, a lake, rock strata, and a place called Canada. This river gorge is mine ... “the My-Agara Gorge.” Therefore this stunt became quite personal.

Many months before, I learned of this event from an unlikely source ... my Cousin Jim. Just one year my senior, he and I grew up together. Jim told me this guy named Wallenda was going to walk the Gorge in June. In my mind, the name Wallenda triggered the title “The Flying Wallendas.” Sure enough, Nik was a 7th generation member of those same circus stars. Knowing this type of stunt was against the law in both the U.S. and Canada, I thought Jim was joking. No, he wasn’t, as both countries agreed to let him try it. The event would be covered by the ABC Television Network, which insisted he wear a safety harness. Jim and I were against that idea ... there has got to be a little “dare” in a daredevil stunt. I suppose ABC (i.e., the money people) didn’t want its viewers to see a man fall to a certain death. That would be bad PR! At any rate, we decided, as “two local boys” born and raised in Niagara Falls, to team up and witness this thing together. He promised folding chairs and a cooler full of drinks (two items difficult to carry on a plane), and I would provide enthusiasm and a photographic record of whatever we would see.

Jim later told me of the difficulty in getting tickets to Terrapin Point, the starting position on the American Side. The 4000 ticket vouchers (to be redeemed later for wristbands) were available on-line, but disappeared in less than 3 minutes. Jim got closed out. So it became a matter of ‘two native sons’ plotting where to best view this feat. Our ideas flowed back and forth ... “How about half-way to the Bridal Veil Falls ... What about Luna Island”... “How about Prospect Point” ... “What about the Observation Tower on the American side.” We were ‘two locals’ trying every trick we knew. I crossed my fingers hoping he could

find a scalper willing to sell two vouchers. All prospects looked grim.

I flew in a few days early to do some reconnaissance, but all of our planned viewpoints seemed dismal. Later that day, I checked into a small motel I had patronized before; the Falls Motel, a quaint, clean, throwback from yesteryear. The motel owner, who recognized my name, told me he had 5 wristbands but only needed 3. For a donation to the local animal shelter (his favorite charity), he would let me have the two remaining. (Let this be a lesson to everyone young and old alike ... it's good to be a regular customer ... business owners tend to like you.) The look on Jim's face when I produced the coveted wristbands was worth a lot more than the donation I made to get them. We were in business!



That beautiful sunny day displayed a festive atmosphere. Besides the ubiquitous rock bands and food stands, there were jugglers, belly dancers, mimes, acrobats, and even young tightrope walkers in training. As the sun was setting we headed to our perfect viewing area. My first concern was about the ever-present mist, which can soak you when the wind is right. The 19th century daredevils never crossed the Gorge through Niagara's mist. It would be a very wet stroll for Nik. Then there were an inordinate number of sea gulls flying around, reminiscent of Hitchcock's "The Birds." Their little 'pea brains' must have told them something was amiss, a cable strung above the brink of the cascading Horseshoe Falls.² Will they harass the man of the hour? We hoped not. Insects bugged us, but couldn't possibly fly through that mist, so at

least they won't bother Wallenda. The skies were getting darker and tensions were building.

At 10:20 p.m. Wallenda stepped onto the wire. I was right below him photographing his first steps. We were all worried about the harness trailing behind him. Will it slide over the connections for the vertically hanging pendulums? Each pendulum had a 50-pound weight holding the tightrope from swaying in the wind currents. The center stabilizer hung a small weather instrument package. I was impressed with that one. Winds were gusting between 19 and 22 mph, and the direction was variable. The winds at some points swirled up around him and at times swirled down around him. The crowd cheered each time his harness slid over a pendulum connector. Slow and steady, he kept his pace down the line. As he disappeared into the mist I found myself saying aloud, "Can he even see where he's going? Can he see anything out there?" Nervously we watched his tiny silhouette moving toward the opposite side. The roar of the crowd on the Canadian side announced his arrival. The scheduled 40-minute walk took less than 26 minutes. We could all breathe again.

Our walk back to Jim's car, parked at great distance, was painless. We were tired, but surrounded by thousands of folks, and we all had a sense of accomplishment. I never saw so many people in the Park at same time, and with such a positive attitude. It was feel-good moment. Driving back to my motel, Jim laughed, "I still can't believe it, I live in this area and couldn't get the wristbands, and you wander in from Kentucky and you're the one who gets them!" We had an unforgettable time. A couple of local boys who grew up hearing these amazing stories of the past, witnessed this history-making spectacle in their own time. Canadian Government officials stated they will not allow anything like this for another 20 years. I wonder if Jim and I can hold on that long.

Footnotes:

1. The first person to go over Niagara Falls in a barrel was a woman, Annie Edson Taylor. She timed her feat to coincide with the 1901 Pan-American Exposition in Buffalo, NY. She was a 63-year old retired school teacher who needed the money.
2. The Horseshoe Falls straddles the International Boundary between the U.S. and Canada. The 2" diameter cable was almost 1800 ft. long and suspended 220 ft. above the Niagara River below the Falls.

Geology of the Bahamas

Sixteen WKU geology majors traveled to San Salvador Island, Bahamas, over the January 2012 Winter Term for a study abroad field course on the geology and natural history of the Bahamas islands. “The Geology of the Bahamas” course was led by geologist Dr Fred Siewers, with assistance from Dr Lisa Park from the National Science Foundation and the University of Akron. The purpose of the course was to study modern environments of limestone formation, the development of caves and karst on tropical islands, and to explore evidence for environmental and climatic change over the last 150,000 years.

Other activities included daily snorkels over modern reefs and an examination of their fossilized counterparts, the biology and hydrogeology of saline lakes and “blue holes,” and an exploration of San Salvador’s rich cultural and human history as preserved in plantation ruins. Dr Siewers said most students were amazed at the diversity of field experiences on San Salvador Island, were surprised at the remoteness and rugged beauty of the island and found the course to be a “life changing experience” that transformed the way they look at the natural world and modern society.

Students participating in the 2012 Winter Term course included: Rachel Bowles, a graduate student from Bowling Green; Justin Cave, a junior from Glendale; Jordan Cottingham, a junior from Sebree; Jacob Gibbs, a sophomore from Bowling Green; Cassie Hornback, a senior from Hodgenville; Lowell Neeper, a junior from Morehead; John Papineau, a senior from Albany; Natasha Patterson, a sophomore from Springfield, Tenn.; Zack Pennington, a junior from Liberty; Mitchell Read, a junior from Elberfeld, Ind.; Andrew Reeder, a graduate student from Bowling Green; Gabe Russell, a graduate student from Bowling Green; Jordan Seng, a senior from Dubois, Ind.; Brandon Thomas, a junior from Russellville; Trevor Thomas, a junior from Bowling Green; and Nathaniel Zoeller, a junior from Shelbyville.

Dr Siewers’ geology field course in the Bahamas is offered every other year during the Winter Term and is one of many study abroad experiences offered by the Department of Geography and Geology.



WKU geology students enjoying study in the Bahamas

WKU Storm Chasers document five tornado touchdowns during 2012 course

The May 2012 summer term was the third year that Dr Josh Durkee’s Field Methods in Weather Analysis and Forecasting class set out across the Great Plains, forecasting and verifying a wide variety of severe weather. As with previous years, the WKU group achieved much success in its mission. This year Dr Durkee, along with Dr Grady Dixon and eight students, traveled 7,900 miles (nearly a round-trip drive from Bowling Green to Anchorage, Alaska) across 16 states (Kentucky, Indiana, Illinois, Missouri, Iowa, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, New Mexico, Colorado, Arkansas and Tennessee) to apply various forecasting techniques with regard to severe weather, and to analyze and document the hazardous outcomes as they unfold.

The overall purpose of this class is to provide a unique and practical capstone learning experience for students studying meteorology that will enhance their understanding of the field beyond a traditional classroom setting. “The majority of the time, meteorology students rarely get to experience what they learn in the classroom, unless the various principles of weather and climate come to them,” Dr Durkee said. “In this class, we turn the tables by using various forecasting techniques to identify the given location of where class will be held and we learn in real time from current events. It’s a learning environment that cannot be beat.”



A Piedmont, OK, tornadic supercell forecast by students.

According to Dr Greg Forbes from The Weather Channel, preliminary statistics indicate that the month of May, a climatological time of year when tornado frequency is typically greatest, was 63 percent below average for 2012. Regardless of a relatively slower severe weather season for May, the WKU Storm Chasers were able to document five tornado touchdowns (one near Minot, N.D., three near Russell, Kan., and one near Piedmont, Okla.), 2-to-3 inch hail, up to 71 mph winds, and flash floods between May 20 and June 3.

“I am extremely pleased with the outcomes from this trip,” Dr Durkee said. “The students were able to accurately forecast and experience a wide variety of severe weather, particularly in mostly open settings away from most urban or densely populated areas.”



Dr Durkee photographs the Piedmont supercell.

We are very much interested in learning about severe weather, but it is tough to deal with when communities are struck with such events.”

This year’s group included students from two universities as WKU students Kyle Berry of Mount Washington, Kyle Mattingly of Owensboro, Becca Ollier of Cincinnati, Chandler Santos of LaGrange, Nathaniel Shearer of Berea, Evan Webb of Hodgenville, Emily Yates of Brentwood, Tenn., were joined by Tami Gray of Cleveland, Miss. Dr Durkee is already putting plans together for the 2013 course offering. In the meantime, you can read the daily student blog entries and view more photos from their journey on the WKU Meteorology Blog and <https://twitter.com/wkustormchase>

Peru 2012 Research Expedition

During the 2012 summer, Dr John All led a research expedition to the Cordillera Blanca of Peru. Dr All is the director of the American Climber Science Program and this ACSP expedition was supported by the American Alpine Club. Three WKU alumni accompanied the expedition and several WKU students along with WKU Associate Professor Dr Aaron Celestian are helping to analyze the data. The expedition comprised sixteen scientists, students, and climbers from institutions including the University of Colorado INSTAAR, NCAR, University of Nevada, Reno, and Western Washington University.

During the expedition, ten peaks were climbed and sampled - up to 6354 meters and grade D+ - (Pisco, Urus Este, Ishinca Traverse, Vallunaraju, Yanapaccha, Chopicalqui, Maparaju, San Juan, Pisco (second set of samples), Alpamayo, and Quitaraju). Nearly every member of the expedition summited a peak – including eight (out of the sixteen members) who had never been above 5000 meters previously.

The team collected data in Quilcayhuanca, Cayesh, Cojup, Ishinca, Llaca, Llanganuno, and Santa Cruz valleys – six of the ten major valleys in the Park. Data acquired included hundreds of land cover and vegetation ground control points, multiple ecological plots, over one hundred snow/

ice samples from the peaks, dozens of water quality samples, atmospheric and reflectance spectra for future atmospheric studies, and an archeological site.

The team strengthened its connection with UN-ASAM – the local university – and with the National Park staff. Next year the team will have several UNASAM students working on graduate degrees as part of the program. They are working with UNASAM faculty on collaborative funding proposals and hope to extend this cooperation in the future.

Overall, the team accomplished its major goals of devising research protocols that will be useful for a larger expedition in 2013 and of identifying gaps in efforts to examine holistically the environmental interactions in the Cordillera Blanca resulting from human activities and climate changes. The climbers will expand their research efforts next year by involving additional scientists with needed expertise.

Readers can see many stunning photos and read posts and comments on the expedition at: (www.mountainscience.org)



Hoffman Institute co-hosts karst groundwater workshops, cave cleanup

Groundwater is one of the most vital resources in karst landscapes, such as those found in south-central Kentucky and the entire peninsula of Florida. In November 2011, four members of the WKU

Geography and Geology Department’s Hoffman Environmental Research Institute — Dr Jason Polk, Dr Leslie North, staff member Jonathan Oglesby and graduate student Kamal Humagain from Nepal – traveled to west-central Florida to host two workshops and a cave cleanup to promote understanding of groundwater in caves and karst environments, practices for protecting groundwater, and educate about human impacts to water resources in karst areas. These workshops were hosted in collaboration with nonprofit land trust The Karst Conservancy and sponsored through a Southwest Florida Water Management District Community Education Grant.

The first of the two workshops, “A Karst Conversation,” featured two short multimedia presentations (What is Karst, produced by the University of South Florida Karst Information Portal and No Reason, produced by Circle of Blue), presentations by local geologists, groundwater scientists and land managers, a guided panel discussion involving residents, and hands-on activities designed to illustrate the interconnectedness of karst systems.



Hoffman Institute staff member Jonathan Oglesby prepared the "Aquifer Awareness" activity. Workshop attendees used dyed water to learn about the inputs and outputs of a karst aquifer system and how easily it can become polluted from human activity.

A highlight of this workshop was the “Aquifer Awareness” group exercise wherein participants simulated tracing flowpaths of rainwater, pollution, groundwater and various inputs and outputs of a karst system using dyed water. Workshop presenters included Dave DeWitt from the Southwest Flor-

ida Water Management District, Grant Harley from the University of Tennessee, Dr Spencer Fleury, Colleen Werner of the Withlacoochee State Forest, and Dawn Velsor and John Burnett of the Hernando County Planning Department. The Dames Caves Complex was the focus of the second workshop held in the afternoon, which involved an educational session to learn about the caves and their connection to the local groundwater system, and several site improvement activities.



Workshop attendees cleaned up trash and pollutants around the Dames Caves site to help protect groundwater that could be contaminated if these were to be washed into the aquifer system.

Dames Caves Complex is a heavily visited and often negatively impacted karst feature located in west-central Florida in the Withlacoochee State Forest. To raise awareness about the sensitivity and importance of this karst feature with regard to groundwater supplies, workshop participants were led on an educational tour of the Complex and engaged in a variety of cave cleanup and restoration activities. These included installing an interpretative sign about karst groundwater and the Dames Caves Complex, which was developed by the Hoffman Institute team and installed by members of The Karst Conservancy.

Karst Conservancy Directors Grant Harley from the University of Tennessee and Robert Brooks from Brooksville, Fla., led groups into the Dames Caves complex to conduct cleaning of graffiti from walls, while Directors Tom Turner and Lance Elder organized cleanup efforts to remove garbage and

trash from nearby Peace Sign Cave, also part of the system. Karst Conservancy associate Mike Stonehocker led the effort to install the signage permanently at the site to withstand the elements and heavy visitation, while creating a natural look to the sign to help it flow with the surrounding landscape. Withlacoochee State Forest Recreation Coordinator Joe Tyberghein commented: "The sign looks great! You have provided a tremendous service to the management of our cave areas. Thank you for taking the time to make a difference.

One local participant noted: "This activity has really brought to my attention the importance of our local groundwater and how karst environments are unique and require understanding and preservation in order to protect our water resources."



Members of the Dames Caves Cleanup Workshop gathered around the newly installed interpretive signage about karst groundwater to help educate the hundreds of weekly visitors.

More than 40 participants attended the workshops. These included representatives from the Withlacoochee State Forest, seven Florida counties, the water management district, local caving grottos, and the local Audubon society, among others. The diverse audience provided the opportunity for multi-perspective discussions and networking to develop future collaborations toward the goal of preserving the karst environment and the precious groundwater resources it provides.

Subsequent monitoring of the Dames Caves site reveals increased visitation by families and positive feedback about the signage and ongoing efforts toward turning the site into an educational preserve.

With continued support from the local community, this site has potential to become a significant source for environmental education about the local karst landscape, including opportunities for student and community engagement projects.

“Public outreach is a critical component of the Hoffman Institute’s educational mission,” noted Geography and Geology Department Head Dr David Keeling. “The initiatives demonstrated in this wonderful project are indicative of the kinds of positive impacts our faculty and students are having on our wider communities.”

For information about the workshops, visit www.hoffmanworld.org/karstinfo. To learn more about karst environments and conservation, visit www.hoffmanworld.org or visit The Karst Conservancy website at www.karstconservancy.org.

Geology Majors REU Research

Four undergraduate Geology majors were involved this summer in nationally-competitive Research Experience for Undergraduate (REU) programs, funded primarily through the National Science Foundation.

Michael Powers (Bowling Green, KY) finished his junior year and travelled to New York City to do research with Dr Julianne Gross at the American Museum of Natural History. His research focused on obtaining bulk compositions of melt inclusions within olivine grains of a Martian meteorite. By analyzing melt inclusions within olivine grains of varying forsterite components, he was able to trace the chemistry of the Martian mantle throughout different stages of its crystallization sequence. Michael says, "Learning about the composition of Mars' mantle and its melt evolution can give us knowledge about how planets differentiate and evolve over time." His research also enabled him “to use several really cool instruments, like an electron microprobe and one of the only CT scanners in the world that is used for scientific research rather than for medical purposes.” He states that he “met a lot of fun and interesting people (Neil deGrasse Tyson included), made several great contacts and did I mention I got to spend 10 weeks in New York City?” Michael will be presenting research at the

44th Lunar and Planetary Science Conference in March in Texas.

Justin Cave (Glendale, KY) travelled to New York City to work with Dr Aaron Bell, a post doctoral fellow at the American Museum of Natural History, focusing on the "Evolution of Topaz Rhyolites from Keg Mountain, Utah, using Feldspar Thermometry and Melt Inclusions." He learned how to use the electron probe micro-analyzer (EPMA) and the scanning electron microscope (SEM), while his research was generally in the fields of igneous petrology and geochemistry. A topaz rhyolite can be loosely defined as a high silica, metaluminous rock that is characteristically enriched in fluorine (>0.2 wt%) and contains incompatible lithophile elements such as Rb, U, Th, Ta, Nb, Y, Be, Li and Cs. Their project analyzed the dissolved fluorine, chlorine, and water in their sample by using melt inclusions inside of quartz phenocrysts as well as calculating the magmatic storage temperatures using feldspar thermometry. Justin is hoping to be the lead author on a publication and will be presenting his research at the upcoming Kentucky Academy of Science meeting in October.

Elaine Flynn (Pendleton, KY) participated in an REU working on San Salvador Island in the Bahamas with six other students and several mentors on the project titled “Field Research on Bahamian Lakes-Exploring Records of Anthropogenic and Climate Change.” The research was designed with a multi-disciplinary group (geology, climatology, hydrology, meteorology, biology, chemistry, and archaeology) and included exploring the local geology, coring, and sampling several blue holes. A nice perk was the opportunity to meet and discuss research with scientists attending a conference on Bahamian geology during the time on the island. Five weeks then were spent in Minnesota analyzing the cores. Elaine says: “Thanks to experience at WKU, I knew some of the procedures we used and learned several more that I hope to use again in future research projects. Our entire team appreciated the chance to meet people with similar interests and to use our classroom knowledge in “real world” situations.” Elaine will present aspects of her research at the national GSA conference in North Carolina in November. Make a point to meet her at the “Surf’s UP” research session in Charlotte!

Travis Garmon (Cumberland, KY) worked with karst hydrologist Dr Calvin Alexander for the summer, through an REU based at the University of Minnesota. He started with a series of dye-trace projects in southeastern Minnesota, learning how to analyze water and activated carbon samples using a spectrofluorophotometer, how to construct activated charcoal detectors, and a moderate amount about the hydrogeology, sedimentology, and stratigraphy of the region. His research also introduced him to various software packages, and developing calibration curves for temperature/conductivity probes. After mentioning his interest in planetary geology, Travis was given another assignment working with Dr Audrey Bouvier, cataloging and reorganizing the meteorite collection at Minnesota. This project led to learning to use an electron microprobe to analyze a thin section of a lunar impact-melt breccia brought back from the lunar surface in one of the Apollo missions (which was quite exciting!). Travis is also planning on presenting his research on dye-tracing in SE Minnesota at the national GSA in Charlotte. Come by and encourage him!

All the students will be continuing work on their research with Geology faculty at WKU, and are now part of a growing body of WKU Geology REU veterans, numbering fifteen in the past nine years. Other summer opportunities include working on- and off-campus in analytical labs, internships, and continuing research projects from prior semesters. Undergraduate research has grown tremendously in large part due to the increased analytical capabilities in the Department and courses with a focus on Analytical and Field Techniques.

You (and your companies) have a chance to be a part of this excitement!! Please contact the Department if you have internship, research, or job possibilities for our students. Financial support helps defray the costs associated with training and use of analytical instrumentation, making this training available for all students. Thank you!!

Summer Field Geology Course

Upper-class geology majors again participated in a geology field course this past summer, along with students and faculty from fourteen other universities, including Illinois State, Northern Illinois, Maryland, Hawaii, Wisconsin-Milwaukee, Sam Houston State, Appalachian State, Middle Tennessee State, Tufts, Keene State, Virginia Tech, Lawrence, Mankato State, and Wesleyan. Students Chris Toney, Jordan Cottingham, Josh Willoughby, Vidal Dias, Shelby Rader, and John Crandall studied the geology of South Dakota, Montana, and Wyoming for six weeks from May 25 through June 30. Shelby Rader earned the top grade for the WKU group, and she is now in a Ph.D. program at the University of Arizona. Way to go Shelby!! Josh Willoughby also earned a high grade and will be nominated for a USGS/ NAGT internship for next summer in recognition of his outstanding work!

Dr Andrew Wulff again taught the final three weeks, as the geology emphasized igneous and metamorphic terrains. The course, which is a capstone for geology B.S. majors at WKU, emphasizes field-mapping techniques to develop geologic maps, construct geologic cross sections, and address some of the practical applications of these maps. Students also composed detailed rock descriptions, measured and constructed stratigraphic sections, and wrote reports and abstracts of their work. Projects included mapping exercises in the Bighorn Mountains, Badlands, Black Hills, Whitewood Peak, and the Absaroka volcanics, which immerse students in a wide range of geologic structures, depositional environments, and rock types.

Additional trips to Yellowstone Park, Devils Tower, various mining operations, and other areas of geologic interest were led by national experts, and extended the geological experiences and built context for the projects. The weather this year was dry and hot (like most of the U.S.), although we did have the chance for several snowball fights in the Beartooths! This group boldly plunged into whatever freezing water available (lakes, streams, etc.) and Vidal also boldly plunged into married life at the end of the field course!... with a wedding cake modeled after Crater Lake! The course was challenging as usual, but it was an exceptional, fun, and

intense experience. A new crop of field geologists is ready for their careers, armed with amazing but true field camp stories!

The Department has sent approximately forty five geology students to various field-based geology opportunities over the past nine years. These summer field courses, and an array of shorter field-based courses and experiences during the semester, are absolutely necessary for setting the field context for both coursework and for professional success. These field experiences, and the analytical expertise learned from coursework have opened up many exceptional opportunities for internships, REUs (see previous story) and, most importantly, career opportunities! We surely appreciate the financial support of alumni that allows for such important experiences. Thank you!!



WKU Geology majors: Chris Toney Jordan Cottingham, Joshua Willoughby, Shelby Rader, Vidal Dias, John Crandall, and Dr Wulff



FACULTY ACTIVITIES

KATIE ALGEO taught a new course on the Geography of Wine during Spring 2012. The course is an outgrowth of her interest in the geography of food and agriculture, and it surveyed wine and viticulture from a geographic perspective, including environmental conditions, cultural traditions (and their combination in the quasi-mystical concept of terroir), and political and economic considerations. The class featured wine tastings and a field trip to a local winery. At the end of the semester, Katie offered a special Alumni College session on Spanish Wines that was well received by all. If you missed Alumni College this year, look for future editions of the wine session in coming years.

Katie continued to do research on Mammoth Cave. This year she has been focusing on the origin and diffusion of underground mushroom production and the history of the short-lived Mammoth Cave Mushroom Company. She made archival research trips to a number of institutions, including the Library of Congress and the Huntington Library in San Marino, California, for her book on the cultural history of Mammoth Cave.

In the arena of service, Katie continues to be active on the Board of Friends of Dumont Hill, a volunteer group in Scottsville, KY, charged with preservation and interpretation the Civil War encampment site at Dumont Hill. A big project this year was the creation of signage for the walking trails, and Katie took the lead in creating the walking trail map to be posted at each entrance. Look for it starting this fall when you visit the park. Katie has also been selected to serve as Treasurer of the Pioneer America Society, an interdisciplinary organization dedicated to the study and preservation of material culture and historic landscapes.

JOHN ALL writes that after extensive research in Nepal and Peru in recent years, the past year was one of catching up. He revamped several of his normal classes including Global Climate Change, Environmental Law, Resource Management, Remote Sensing, and Biogeography to add both new content

and new student research components. He also led numerous student independent research projects that were presented at regional conferences, including the Kentucky Academy of Sciences and the WKU Student Research Conference.



The past year was also an opportunity to catch up on publishing and grant writing. Dr All submitted an NSF grant examining the impact of climate change and resource management in grasslands and remnant alpine forests in the Cordillera Blanca of Peru. He also submitted several manuscripts from his field research, including one examining the impacts of climate change on vegetation and the effect that the Maoist Civil War in Nepal had on the National Parks and Protected Areas in the Himalayas. This was co-authored by a student alumni of the Department, along with an article examining the effect of climate change on Mount Everest.

A great deal of Dr All's time recently has been consumed by the American Climber Science Program. John is the Director of this program that is sponsored by the American Alpine Club and supported by numerous partners such as Black Diamond, Petzl, Boreal, and Voltaic Solar Systems. During this past summer, Dr All led a ten-week expedition to the Cordillera Blanca that included sixteen scientists from a variety of US and Peruvian institutions, and three WKU alumni also participated. The expedition was intended to lay the groundwork for a 50-member expedition with multiple teams that will be led by Dr All in 2013. During this summer's expedition, team members collected a huge amount of data that are

currently being analyzed by students and will be used in classes such as Remote Sensing.

Dr Aaron Celestian is also working with samples collected during this time. John led every climb for the expedition and summited a total of ten peaks during the summer. He climbed the world-famous peak Alpmayo (voted the World's Most Beautiful Peak in the 1950s) in under three hours. Due to the length and difficulty of the expedition, Dr All also lost fifty pounds and he is working diligently to recover that lost weight now that he is back in the land of hamburgers and pizza. Dr All will be giving lectures on the American Climber Science Program in numerous cities during the coming year in order to raise funds and recruit scientists and climbers. With the support of the American Alpine Club, he will be speaking in Boston, New York, LA, Seattle, San Francisco, and Atlanta at a minimum. Several WKU students and faculty will be involved in the 2013 expedition – so if you are interested in climbing over 20,000 feet, contact Dr. All!

KEVIN CARY writes that it's been another terrific year. He spent a week in San Diego this summer at ESRI's education and international user conference where he presented information about GIS internships in the campus community. At the conference, he met with five of his former students. Two of the five, Thomas Zhang (2nd-year geoscience graduate student) and Dustin Horn (May 2012 GIScience graduate), won an assistantship for the conference, making this year the 12th consecutive year the Department has had students from its GIS program win assistantships. Only 60 are chosen from the United States.

Kevin continues to be a reviewer for the GIS Certification Institute (<http://www.gisci.org/>). He has been a certified GIS professional since 2005 and certification must be renewed every five years. Professional certification in GIS began in 2004. As of July, 2012, there are over 5,100 certified GIS professionals (GISP) worldwide.

Kevin keeps busy teaching GIS courses and managing the GIS labs. The labs are comprised of a student teaching lab and the Center for GIS. The



Center for GIS is a place for student projects/research, student internships, and independent courses in GIS. Projects include working with the Baker Arboretum; Department of Planning, Design, and Construction; WKU Facilities Management; Logan County Economic Development; Geoscire (<http://www.wku.edu/geoscire>); and the Blueways of Warren Co. (<http://www.wku.edu/blueways>). The Center for GIS has four servers used for teaching and services. Servers are equipped with ArcSDE, ArcGIS Server, and MS SQL, as well as ArcGIS Desktop and data.

He's currently looking forward to attending this year's Kentucky GIS conference in Louisville. The conference is hosted by the Kentucky Association of Mapping Professionals (<http://kampro.org/>) and will convene September 26-28. He'll present more on GIS internships and participate as a panelist to discuss developing best practices in the ESRI site license program for postsecondary education in Kentucky.

AARON CELESTIAN writes that it's been a busy year in the Celestian Group! Their research has taken them to conferences in the USA and Canada, and to Brookhaven National Lab on Long Island, NY. Dr Celestian presented a summary of the group's latest work on synthesis and ion exchange in nanoporous materials for the 1st Annual Kentucky Nanotechnology Symposium in March, 2012. Multiple students presented at the 42nd Annual WKU Student Research Conference, also in March, and Shelby Rader was awarded Best Undergraduate Presentation for her work on ion selectivity in the porous mineral umbite. Shelby graduated this year *summa cum laude* with degrees in both Geology and Chemistry. She was accepted into the best geology graduate programs around the world, and finally chose the University of Arizona, which is a fine choice given that it is Dr Celestian's undergraduate alma mater. She will be missed in the department, and we look forward to watching her progress in mineralogy and geochemistry.

Not to be outdone, current students Melinda Rucks and Michael Powers are aggressively

pursuing research projects of their own. Ms Rucks has been working in the field of medial mineralogy, as well as ion exchange in porous minerals. One project focuses on the decomposition of amphiboles into asbestos-form talc. She is using both optical mineralogy and spectroscopy data to determine why certain mining areas are more prone to toxic dusts. This research is in collaboration with Prof. Mickey Gunter at University of Idaho, a world-renowned expert in asbestos mineralogy and human health. Additionally, Melinda also made significant progress in synthesizing and ion exchanging rare earth elements in nanoporous minerals. It is hoped that these mineral-based novel materials will provide enhanced catalytic cracking efficiency to the petroleum industries.

For her third summer project and in collaboration for Dr John All (yes, she is that productive!), she used X-ray diffraction and Raman spectroscopy to characterize a suite of airborne particulate samples from mountain peaks in the Andes. She found a large mineral diversity in the samples with some particles >2 mm in size, which is unusual for aeolian-transported materials. The identified minerals include single crystal feldspars, talc asbestos, quartz, and copper minerals, suggesting that dust from lower elevation mines can travel to 20,000+ feet in atmosphere or higher. Clearly these findings have potential health impacts for inhabitants of the Andes region. Ms Rucks is the presenter or co-author on abstracts submitted to the annual Geological Society of America meeting (in Charlotte, NC), and at the American Geophysical Union conference (in San Francisco, CA).

Mr Powers' research focuses on synthesis of and ion exchange into titanium silicates. These materials, based on the mineral sitinakite, are highly selective for certain cations (including some rare earth elements and radioactive products of the nuclear energy industry) and have a wide range of potential applications, from environmental sequestration to battery materials to industrial catalysis. Some of this work was presented by Dr



Celestian in June, 2012, at the Goldschmidt Conference of the Geochemical Society in Montréal, Canada.

Michael won multiple, highly competitive summer research fellowships, and spent much of the summer working in New York City at the American Museum of Natural History. While on the east coast, he joined Dr Celestian and Ms Rader at the National Synchrotron Light Source, Brookhaven National Lab, to perform real-time ion exchange experiments on nanoporous titanium and zirconium silicates. The enormous success and productivity of these intense non-stop four-day experiments will shed light onto some of the darkest areas of mineral chemistry. Mr Powers will be presenting his latest research at the annual GSA meeting, thanks in part to the Faculty-

Undergraduate Student Engagement (FUSE) grant that he and Dr Celestian were awarded in the spring.

As Director of the Advanced Materials Institute, Dr Celestian has seen tremendous growth of the facility as well as a huge increase in student users. The AMI is open to all WKU faculty and students who have research projects that are related to materials development, production, and characterization. This state-of-the-art central facility provides student training, research project development, and access to Kentucky's materials community. Several recent projects have been published from Dr Celestian's group for the characterization of novel minerals for radioactive waste sequestration, Dr Dakshinamurthy (Chemistry) for gold nanoparticle synthesis using plants, and Dr Yan (Chemistry) for the development of new metal-organic hybrid crystals. The AMI's increasing industrial partnerships means more facilities, more projects, and more job opportunities awaiting current students and recent graduates.

MARGARET CROWDER writes that, this past year, she taught her regular classes and finished taking course work towards her Ed.D. She also wrote and wrote and wrote toward her

dissertation. Currently, she is suffering from some creative writing blocks and...well, there you go, the train of thought went right down the lava tube!

Speaking of lava, Margaret did take a break from writing over the summer to travel to Hawai'i to attend the International Conference on Social Sciences and to experience the sights of an active volcano. While the conference was great – full of interesting talks and wonderful networking opportunities - Kilauea Volcano took the lava cake. Leaving Oahu behind, Margaret traveled to the Big Island for a day to experience Hawai'i Volcanoes National Park. While there, she hiked the Kilauea Iki Trail down into the crater of an eruption from 1959. It is amazing, and somewhat disconcerting, that steam still rises from the floor of this over half-century old lava lake. Margaret also visited the Halema'uma'u Crater overlook at the Jaggar Museum, which is located right next to Kilauea Caldera.

Of course, the most fantastic vantage point for seeing volcanic activity on the Big Island is from the air and so Margaret took a helicopter ride over the Pu'u 'O'o crater. After taking enough pictures to drain the batteries in both camera and cell phone, Margaret now has an exciting new set of experiences, images, and videos to share with her geology students. Geology related travel is the lava bomb!



One other trip Margaret took over the summer was to Monterey, CA, for the Earth System Science Education Alliance (ESSEA) annual conference.

There, she presented a poster she co-authored with Geoscience graduate student Andrew Reeder on “Developing student centered learning laboratories in Physical Geology.” The poster focused on some of Margaret’s grant-related work regarding specific ways to enhance laboratory experiences by making them more inquiry-based and student centered. The ESSEA conference also helped Margaret prepare for her new course offering this Fall – Geol 305 Earth System Science for Teachers. The course is based on a well-developed ESSEA platform for problem-based learning and helps prepare future science teachers by encouraging them to think about environmental relationships and to develop their own problem-based learning lesson plans to use with their future students.

In summary, it’s been another crazy-busy year for Margaret (but then, hasn’t it been for everyone??)! For all of you who are in that crazy-busy boat, just remember, “Not everything that can be counted counts and not everything that counts can be counted” (Bruce Cameron, 1963). Take some time off on occasion to go with the lava flow (or at least watch the lava flow, as your crazy-busy boat may not be lava proof). ☺

SCOTT DOBLER has completed his twelfth year at Western Kentucky University, and continues as the co-coordinator of the Kentucky Geographic Alliance (KGA) (<http://www.kga.org>). The KGA has been funded by an ongoing grant from National Geographic to support the development of geography awareness in and outside of the classroom. Over the past two years, Scott has been working with other members of the KGA on strategic planning.

The results of this planning have created a stronger relationship between the government, public and private sectors, public schools, and higher education in regards to geographic literacy. In addition, over the summer, the KGA signed a contract with ESRI to provide GIS software to Kentucky primary and secondary schools free of charge. During this year the KGA team will be developing a summer program that trains STEM teachers to develop project-based GIS content for their students while supporting their curriculum requirements.

A Kentucky atlas has been developed to be used by teachers to support social studies and science classrooms. Currently, Kentucky teachers are developing lesson plans that will supplement the atlas. The last step in this product is to find a number of sponsors in order to deliver a copy to each school in Kentucky. Currently the atlas has been updated with 2010 US census data, and we are searching for additional support.

Scott continues to develop and revitalize lesson plans for the Kentucky Mesonet (<http://www.kymesonet.org/>) to help K-12 teachers use local meteorological data in their classrooms. Teachers will be able to use real-time data in their school from the Kentucky Mesonet, while following teacher-developed lesson plans that address their required curriculum.

In the year to come, Scott will be working with state and local educators to help implement Geographic Information Science (GIS) in schools. He will also be searching for additional funds to create an endowment for the Kentucky Geographic Alliance and to continue funding the K-12 Atlas project. If you have any ideas or suggestions (or money), please contact Scott.



JOSH DURKEE completed his fourth year at WKU, and taught Weather Analysis and Forecasting (GEOG 424), Honors Meteorology (GEOG 121H), and two sections of Introduction to the Physical Environment (GEOG 100). His students in GEOG 424 competed in the national forecasting competition, WxChallenge, which hosts close to 2,500 forecasters that range in skill up to the professional level. Josh's new field-based course, "Field Methods in Weather Analysis & Forecasting" had another successful learning adventure. This year, the group traveled nearly 7,900 miles across 16 states, and successfully predicted and tracked numerous severe storms and documented up to six tornadoes. Plans for the 2013 WKU Storm Chase adventure are currently underway.

Additionally, Josh was actively involved in various activities including student chapters of the American Meteorological Society, the implementation of the new home to the Four Rivers division of the National Weather Association, the WKU Storm Spotter Network, the Science Olympiad, and a new Meteorology workshop at the Cumberland Trace Elementary School here in Bowling Green, KY.

In terms of research activity, Josh published an article in the *Bulletin of the American Meteorological Society*, which provided an important atmospheric analysis and perspective on the historic Mid-South precipitation and flood event that took place in May 2010. A unique aspect of this project was that it stemmed from a collaborative effort between Rezaul Mahmood, Greg Goodrich, Stuart Foster, and three WKU undergraduate students who all co-authored the effort in this top-ranking peer-reviewed journal. Josh has a second article in press in *National Weather Digest*, which provides a diagnostic case-study analysis of a particularly complex non-convective high-wind event over the Great Lakes region in 2003.

Aside from his own research endeavors, Josh has collaborated with a number of undergraduate students that resulted in seven professional conference presentations at the national, regional, and local levels. Furthermore, Josh continues the collaborative effort with other faculty within Ogden College on a National Science Foundation-funded effort that involves undergraduate researchers from around the country to study various aspects of the Green River Watershed in KY.

STUART FOSTER completed his 24th year in the department and his 12th year serving as state climatologist for Kentucky. He is now the senior member of the faculty in the Department of Geography and Geology. "It is hard to believe that the entire faculty who helped mentor me in my early days here at WKU has either left the

department, retired, or passed on. I am fortunate to have outstanding colleagues today, but the faculty who came before deserve credit for helping to set the bar high when it comes to teaching, research, and service activities,” said Foster. “Beyond the department and university, it is hard to believe how much Bowling Green has grown since Jo Ann and I first arrived in 1988. Campbell Lane was a two-lane road with little traffic. There was no University Plaza, Sloan Convention Center, or Crosswinds Golf Course. Now, with the new Bowling Green Ballpark, Southern Kentucky Performing Arts Center, and summer concerts in the park that bring thousands of people downtown, Bowling Green has really become an attractive community.”

It was another year of weather and climate extremes that kept the Kentucky Climate Center and Kentucky Mesonet in the news. After extensive flooding in the spring of 2011 and the wettest year on record throughout much of the eastern United States, 2012 brought extreme drought to western Kentucky. Dr Foster made three trips to the Jackson Purchase area to document drought impacts during the late spring and summer, provided numerous media interviews concerning the drought, and was an active contributor to Kentucky’s Drought Mitigation and Response Team that advised Governor Beshear. According to Foster, many locations in western Kentucky experienced the most intense drought in more than 100 years of recorded observations.

Dr Foster represented the Kentucky Climate Center as an invited speaker at several meetings over the past year. Among these were the Tennessee Valley Public Power Association’s Quarterly Meeting of the Operations Coordination Committee in Nashville, Tennessee, the 2012 Kentucky Weather Workshop hosted by the Kentucky Division of Emergency Management in Bowling Green, the Climate Change and Kentucky Small Grains Production Workshop hosted by the University of Kentucky’s College of Agriculture in Lexington, Kentucky’s 2012 Regional Conference on Nature’s Call to Action hosted by the Kentucky Transportation Cabinet and Federal Highway Administration in Frankfort, and the Summer Meeting of the AgriBusiness Association of



Kentucky and Kentucky Feed Grain Association held in Bowling Green.

Finally, Dr Foster began a two-year term as president of the American Association of State Climatologists. “There are a number of challenges and opportunities that lie ahead for the organization as the awareness of climate and demand for climate services grow,” said Dr Foster. “It is an honor for me to serve people I hold in high esteem, and I look forward to the next two years.”

GREG GOODRICH published three articles in 2011-12, all in peer-reviewed journals. Durkee et al. 2012, was a collaborative article published in the *Bulletin of the American Meteorological Society* about the May 1-2, 2010, Mid-South flood with Drs Durkee, Mahmood, and Foster, along with three student co-authors (recent B.S. Meteorology graduates Lee Campbell, Kyle Berry, and Dustin Jordan). The students did an excellent job publicizing this article by presenting this research at nearly a dozen local, regional, and national conferences over the past year. Kalkstein and Goodrich 2012 was an article linking air pollution and precipitation in Phoenix, Arizona to climate teleconnections such as the Pacific Decadal Oscillation. This

article was started in 2005 when Dr Goodrich was a graduate student at Arizona State University with Dr Kalkstein (now with the U.S. Military Academy at West Point) and was published in the *Journal of the Arizona-Nevada Academy of Science*. Finally, Dr Goodrich and M.S. Geoscience graduate John Walker published an article in *Physical Geography* that categorized the relationship between ENSO and the Pacific Decadal Oscillation in the eastern United States. This article was part of a summer faculty scholarship from 2006.

Dr Goodrich was also involved in another collaborative research project with Dr Xingang Fan and eleven undergraduate students that investigated the impact of climate teleconnections on the 2011 summer heat wave and drought in the Great Plains. This manuscript was submitted to the *International Journal of Climatology*. Dr Goodrich is also working on completing revisions to a potential manuscript

related to Dasen Kendrick's thesis project relating to ground ozone concentrations at Mammoth Cave National Park. For 2012-13, Dr. Goodrich is working with undergraduate student Ashlan Clark on a project investigating the spatial risk of nocturnal tornadoes in the Mid-South. He is also working with graduate student Jeremy Young on the completion of his M.S. thesis on the teleconnective impacts on post-tropical cyclones in the United States.

In the classroom Dr. Goodrich taught classes he had taught before, including sections of GEOG 431 (Dynamic Meteorology I), GEOG 433 (Dynamic Meteorology II), and GEOS 500 (Graduate Research and Literacy). The Meteorology Program continues to grow and prosper under the guidance of Dr. Goodrich. The third cohort of graduates in the new B.S. Meteorology major found success in the job market in 2011-12. Two graduates were hired by the National Weather Service (Ian Blaylock – Corpus Christi, TX; and Geoscience graduate Mitchell Gaines – Mt. Holly, NJ) and a third student, Evan Webb, will begin his career with the Grand Rapids, MI, office when he graduates in December. One of our 2010 graduates, Tony Bedel, found employment with the Kentucky Division of Air Quality after completing his M.S. degree in Geography from the University of Georgia. Finally, graduate Kyle Mattingly began his graduate career, also at the University of Georgia.



MARGARET “PEGGY” GRIPSHOVER writes that her big news for the year is that she was granted tenure and promotion to Associate Professor in 2012. She is very happy about that because she thinks this means that now more people will be willing to “associate” with her! During the 2011-2012 academic year, she taught courses in World Regional Geography, Cultural Geography, and Economic Geography. She also saw her first Master's student -- Melissa Cary--complete her thesis on music festival marketing and graduate. Peggy continued horsing around over the past year working on her Kentucky Derby research and digging up onions for her work on

innovation in specialized agriculture. “Dr G.” spent the last year documenting the foaling locations for all 103 Kentucky-born Kentucky Derby winners. Her research was funded by a New Faculty Grant from WKU's Office of Sponsored Programs.

She was camped out for many days at the Keeneland Library in Lexington and traveled just about every back road in Fayette, Woodford, and Bourbon counties this summer, documenting farm locations and landscape change in the Inner Bluegrass region. She presented the preliminary results of her research in September, 2012, at the 44th Annual Meeting of the Pioneer American Society/Association for the Preservation of Artifacts and Landscape Conference in Philadelphia, PA.

Peggy also reviewed a book on horse racing, *How Kentucky Became Southern: A Tale of Outlaws, Horse Thieves, Gamblers, and Breeders*, by Maryjean Wall, for the *Journal of Southern History* (78:2, 479-80). Other than the fact that they can be quite smelly, horses and onions may not appear to have much in common, but that didn't stop Peggy from researching both topics over the past few years. In 2012, Dr G., along

with husband and fellow geographer Dr Tom Bell, published their research on onion harvesting machinery patents in the peer-reviewed journal *Material Culture* (44:1, 1-30). The dynamic duo of geography also presented their onion research at the Annual Meeting of the Association of American Geographers in New York, NY, and at the Annual Meeting of the Southeastern Division of the Association of American Geographers in Savannah.

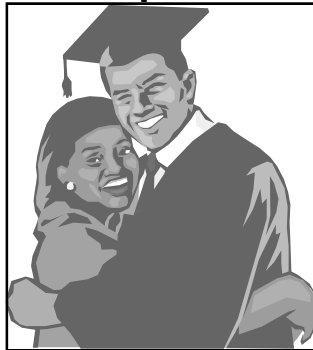
Peggy and Tom have been invited to present their research on onion patents at the Annual Meeting of the Association for Living History, Farm & Agricultural Museums to be held in Akron, OH, in June, 2013. Peggy and Tom also team up to co-edit the journal *FOCUS on Geography* for the American Geographical Society. She is also collaborating with Tom and Dr Ola Johansson of the University of Pittsburgh at Johnstown, on a music landscapes paper to be presented at the Pioneer American Society

meeting in Philadelphia. Peggy is continuing to examine patents as material culture and evidence of technological specialization and diffusion beyond the stinky subject of onions.

In April, 2012, she was invited to give a talk on patents granted to Allen County residents to the Allen County Historical Society in Scottsville, KY, and she is also examining linkages between horse racing-related patents and specialization in horse breeding and racing in Kentucky. And in the “keeping it local” theme, Peggy’s research also includes work on the historic Shake Rag neighborhood of Bowling Green. Other ongoing long-term projects include her book on Chicago’s Wrigley Field which, it is hoped, will be ready to go to press in 2014, just in time for the 100th anniversary of the opening of the ballpark.

Peggy is also planning a book project based on her Kentucky Derby research. She is also a contributing author for a forthcoming human geography textbook by Lydia and Alex Pulsipher to be published by W. H. Freeman. When she is not horsing around with Derby data, onion harvesters, or baseballs, Dr G. can be found stumbling around on the local tennis courts playing in leagues and tournaments. In August 2012, she, along with partner Vicky Harrell, won the women’s doubles title at the CASA Benefit Tennis Tournament. When not fainting from heat stroke on the tennis courts during the hottest summer on record, Peggy is in her kitchen cooking up some goodies from her garden or exploring blue highways with husband Tom and their intrepid Australian Shepherd, Sophie, who had some of her own excitement this year. Sophie, along with Goldie Kreitzer and Goldie’s human Debbie Kreitzer, were participants in the inaugural Big Red Barking Band that marched in the 2011 WKU Homecoming Parade. Sophie’s instrument, you ask? Why, a didgeridoo, of course!

CHRIS GROVES ended last year’s GEOGRAM update in the grocery section of a Walmart with his family somewhere in southwest China, and the rest of last summer’s two-month trip was smooth and productive. Making its way back to WKU, the team visited Vietnam and Hong Kong, each location with its own research agenda. In Hanoi



Chris and family met with old friend Vu Nguyet of the Vietnam Institute of Geosciences and Mineral Recourses, who led them south for several days to Phong Nha-Ke Bang national park, home to the recently discovered Son Đoòng Cave, which has the largest cave passages ever discovered. The trip home from there was then broken up with a stop at Hong Kong Disneyland, which was wonderful (and yes complete with an Asian Snow White and Tinkerbell).

The Hoffman Institute continued to build its programs, with 22 faculty, staff, and students on the clock this year. Sean Vanderhoff and Celia Davis completed Master’s programs, several others are getting close to finishing, and we have several new students eager to get started. In the Crawford

Hydrology lab things continue to go well under the direction of Lab Manager Lee Anne Bledsoe, and the year provided a number of new and interesting projects for its staff and students. The team had to tread lightly on one major project, which required dye tracing work on a military base in a forest full of unexploded bombs. It is indeed a memorable experience to come out of the woods to the back side of a sign that, on the other side, says in effect “whatever you do, don’t go beyond this sign!” In collaboration with the energy and skills of Jason Polk and Leslie North, the Institute continued work on other projects in Asia, Europe, and the Caribbean, and the annual summer Karst Field Studies program at Mammoth Cave was a fine success, despite the nation’s slow economy.

The Institute’s China programs continued well, with a focus on understanding geochemical interactions associated with the natural removal of atmospheric carbon dioxide through limestone dissolution in karst regions. With new funding from the US and China this year, Groves and his colleagues are now developing a pair of reference research sites (one here at Lost River Cave and one in China) to standardize measurement of this flux for an eventual global network of sites. Following last summer’s trip, Groves returned to China in December and April to work on the project, and will lead a WKU team in December, providing opportunities for several graduate students to make trips to China this year. In

November, the China/US collaboration was featured in a story in the journal *Science*.

Groves was happily the recipient of several awards this year, including the Kentucky Academy of Science Superlative Award for Distinguished College/University Scientist and indeed, as the highlight of an entire career, was chosen by China's Ministry of Land and Resources as a finalist for the People's Republic of China Friendship Award, the country's highest award for "foreign experts who have made outstanding contributions to the country's economic and social progress."

Otherwise it has been a fun year with family and work, and the help and support of family, friends and colleagues in all of these activities is much appreciated. Lillian (now 9) and Leah (5) continue to grow like proverbial weeds. Across the street over at the WKU Library, Deana has been serving as Acting Department Head for Library Technical Services, with the levels of both stress and (probably way deep down there somewhere) satisfaction that one would expect, and she is looking forward to a future when the new Dean is chosen and everyone can settle back into their regular jobs.

DAVID J. KEELING writes that his nineteenth year in the Department, and eleventh as Department Head, continued to generate challenges, excitement, multiple international trips, a couple of informative conferences and workshops, and lots of hard-working students to keep him extremely busy.

Travel across the planet, of course, remains the highlight of Dr Keeling's year! For four weeks in May-June 2011, he led the annual study abroad program to Argentina, accompanied by Dr. Nelson López from Bellamine University. After a week in Buenos Aires, the 10-student group set off on a driving adventure across the pampas grasslands to Salta, in the northwestern corner of the country. After ten days in historic, colonial Salta, with visits to surrounding communities, the group headed back to B.A. via the pampas. The program ended with a final six days back in Buenos Aires.

In late July, he traveled across the big pond (the Atlantic) to Lincolnshire, England, to continue his

research project on rail freight challenges in the western part of this very rural county. A follow-up trip to Lincolnshire in October continued the investigation, along with a visit to the University of Swansea to explore possible student exchanges. In November, he flew across the Pacific to Auckland, New Zealand, with a quick stop in Sydney, Australia, to visit the University of Auckland and to investigate a new transport link under development near Whangarei north of Auckland. His international travel for the year closed out in March and April with an Around the World educational expedition for the American Geographical Society. During visits to Egypt, Rwanda, South Africa, the Maldives, Thailand, Bhutan, India, Jordan, and England, he gave several lectures on political geography, environmental change, and transportation.

Locally, Dr Keeling served on a geography Ph.D. dissertation committee at the University of West Virginia in Morgantown, attended a council meeting of the American Geographical Society in Brooklyn, NY, and presented research at the first World Human Geography conference of the American Geographical Society in Lawrence, KS. He presented a paper on his Medellín, Colombia, research, which will appear in the Winter issue of FOCUS on Geography as part of a special issue on Bowman Expedition research sponsored by the AGS.

Within the community and on campus, Dr Keeling gave several talks on issues ranging from cyberwarfare and geopolitics to WKU's international reach, appearing on the WKYU-TV program *Outlook* (check it out on Youtube) in April. He also gave a talk at the Village manor retirement community on Gabon, and at Barnes and Noble for WKU's Far Away Places series. Dr Keeling also continued to serve as a National Councilor for the American Geographical Society, and as the webmaster for the Society (visit www.amergeog.org).

As Department Head, Dr Keeling still attends way too many meetings during the year, but managed to contribute to a number of college and campus-wide committees and initiatives, and to international education on campus. Moreover, he continues to publish the results of research, with several articles in



print or in press as the year came to an end. His illustrated article titled “Iconic Landscapes: The Lyrical Links of Songs and Cities” appeared in the Winter 2011 issue of *FOCUS on Geography*, and he contributed to a new feature in the same journal titled “A Picture is Worth a 1000 Words: The Tuareg of Timia, Niger.” His “Annotated Websites” contributions appeared in the *Journal of Latin American Geography*, and a retrospective on urban geographer Larry Ford’s work in the *Geographical Review* appeared in the Fall 2011 issue. He also reviewed 20 different manuscripts and two books for a number of publishers and academic journals during the year.

Finally, he served on a number of graduate committees in the Department, with Sami Almudaris, Nate Oris, and Laura Benneyworth successfully defending their M.S. Geoscience research theses. Congratulations to all of our program majors and graduate students who left the Hill this past year with degrees safely in hand and great career opportunities in front of them—stay in touch!

As always, Dr Keeling encourages past, present, and potential students to come by and share travel stories, information, and geographic tidbits. He can be reached easily in cyberspace at: david.keeling@wku.edu or by phone at (270) 745-4555. Also, visit Dr Keeling’s homepage on the World Wide Web—just enter: <http://people.wku.edu/david.keeling>.

DEBBIE KREITZER writes that 2011/2012 proved to be another exciting and productive year. Debbie spent another very industrious year teaching, researching, traveling and planning new geographical experiences. During the past year, she was involved in teaching the Fundamentals of GIS, Geography of Europe, World Regional Geography, Professional Preparation, and Gender in the Developing World. She is also continuing to teach two online courses for Independent Learning at WKU: World Regional Geography and Natural Resource Management.

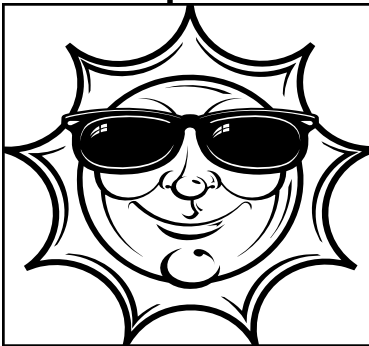
As well as teaching, Debbie spent the year serving on the University Senate and Senate executive committee trying to make meaningful changes that will help students, faculty, and staff. One of the other

fun things Debbie has been doing the last few years is making the PowerPoint presentation for the yearly Honors Night

Along with the other faculty in the Department, Debbie is also dedicated to continued learning by attending research conferences and meeting with experts and colleagues in the field of geography. She also participated in the State Geography Bee as a Moderator and in the State Science Olympiad. Both of these competitions illustrate what great K-12 students we have in Kentucky!

Debbie and Will Blackburn are offering a Study Abroad Program to the British Isles this coming summer (Summer 2013). Some of you remember the 2004 British Isles trip and how much you learned - and how much fun it was (you can help others experience the same things by making a contribution to our scholarship fund!).

For more information about her interests or about study abroad, please contact Debbie at this email address <debbie.kreitzer@wku.edu>.



REZAUL MAHMOOD

has continued to contribute to the departmental teaching, research, and service missions. He taught courses in Physical Climatology, supervised graduate theses, and several independent study courses. Rezaul’s research focus remained anchored in impacts of land-cover change on weather and climate, soil moisture, and land-surface-atmosphere interactions, modeling transport of aerosols, and the hydrometeorology of flash flooding in eastern KY and the Appalachian region. Five graduate and six undergraduate students participated in these research activities and gained hands-on learning experiences. Rezaul mentored two students to present papers and posters at the 108th Annual Meeting of the Association of American Geographers (AAG) in New York, and at the 92nd Annual Meeting of the American Meteorological Society in New Orleans. He also presented papers at the AMS meeting in New Orleans. In addition, he gave several invited presentations in China and at the University of Kentucky.

During the past academic year, Rezaul published his research in a number of peer-reviewed journals,

including *Tellus A: Dynamic Meteorology and Oceanography; Water, Air, and Soil Pollution; Applied Geography; Bulletin of The American Meteorological Society; and Journal of Hydrometeorology*. He also co-authored a technical report published by the USGS. This report is produced in support of the forthcoming National Climate Assessment report. Rezaul has continued to serve as Editor of the journal *Earth Interactions*. He also serves on the editorial board of *Geography Compass*. In addition to his current appointment to the National Climate Assessment Development and Advisory Committee (NCADAC), Rezaul has also been invited to serve on the Board of Directors of the Applied Geography Conference.

Dr Mahmood traveled to China for a month (see additional piece in this issue of GEOGRAM) for collaborative research in modeling the impacts of land cover changes on weather and climate. He was invited by the Institute of Atmospheric Physics (IAP), Chinese Academy Sciences (CAS). Rezaul also visited Bangladesh and interacted with several colleagues from Bangladesh University of Engineering and Technology in an effort to develop collaborative research relationships.

Rezaul and Dr Stuart Foster have continued to build the Kentucky Mesonet. This is a world-class, research-grade operational network for weather and climate monitoring. This is only the second of this type of network in the world. Currently, 63 stations in Kentucky are operational under this network. Live data can be viewed at www.kymesonet.org.

He is also pleased to note that a \$3.5 million cluster computing facility (~4000 cores) is now operational here at WKU. Dr Claire Rinehart (Biology) and Rezaul largely guided this project. This facility makes possible computationally demanding weather and climate modeling.

Dr Cathleen Webb (Chemistry) and Rezaul have completed the 6th year of their National Science Foundation funded Research Experience for Undergraduate (NSF-REU) program. A number of faculty from Geography and Geology (Drs Durkee, Fan, Groves, Polk, Celestian, and Kevin Cary) and Chemistry mentored participating students. The

majority of the students were from institutions outside Kentucky. Rezaul continued his research on emissions from animal farming operations and their transport. This work is funded by the United States Department of Agriculture (USDA). Rezaul also submitted several large competitive grants this year.

MICHAEL MAY is seeing a few items come to fruition after a number of years of effort. First of all, his interest in unconventional resources in the Kentucky region has resulted in a gift being granted to the Department from the Reynolds Foundation. A total of \$120,000 has been pledged by Reynolds, payable in three annual installments of \$40,000 each. In EST Room 326 the paint is drying and new computer work stations are being installed as the Geology faculty get excited about using the Reynolds gift to establish the William G. Reynolds Geoscience Resources Laboratory. This room will be used as a research and study center for those students interested in geological resources such as oil, natural gas, asphalt rock, as well as traditional economic geology resources such as metallic ores, industrial minerals, and aggregate.

A second item that has come to fruition is his publishing of a chapter in the AAPG Studies in Geology book series entitled *Oil-saturated Mississippian-Pennsylvanian Sandstones of South-central Kentucky*. A pre-publication release of this paper has sparked interest in nearly half a dozen individuals or oil companies desiring to invest in south-central Kentucky hydrocarbon plays. Several of Dr May's graduate students are working on these related to this paper and have met with oil company geologists and engineers in the hope of cooperatives, permanent employment, or funding for thesis research.

It was a busy year for the Geology Program as a new faculty member to teach structural geology and tectonics was hired (Dr Nahid Gani). Dr May and other faculty were involved in interviewing for the position in fall 2011 and spring 2012. There has been a sizeable increase in geology focused Master's students working in the Department. Dr May is chairing the theses of Linda Baizel and Jeremy



London and he is on the committee for Andrew Reeder (chaired by Dr Siewers). Growth in the Graduate Program continues as there will be an additional student joining the graduate cadre that Dr May advises this fall.

In addition to Dr May's involvement with graduate students, he continues to engage undergraduate students in research. At least four presentations by student groups on Illinois Basin stratigraphic problems were delivered at the 2012 WKU Spring Research Conference. A good example of an undergraduate research presentation away from campus under his supervision included a poster by Buddy Price (now at Oklahoma State doing an M.S. in Geology), Chris Driver and Keith Conn titled "Understanding the Earth System through Field and Digital Mapping Techniques in the Mississippian and Pennsylvanian of Western Kentucky." This poster was presented at the National Geological Society of America Annual Meeting held in Minneapolis, MN, in October 2011. Dr May also presented a poster with co-authors Drs Wulff, Celestian and Siewers at the Minneapolis meeting entitled "Portals in the Geology Curriculum for Undergraduate Research." This poster chronicled the relatively unique WKU Geology Program that is characterized by early immersion of students in field and analytical methods.

Dr May along with Dr Siewers and instructor Joe Islas traveled with a group of undergraduates to the national American Association of Petroleum Geologists convention in Long Beach, California, in April 2012. A primary goal of attending the conference was to learn more about available software for aiding in subsurface geologic investigations, particularly software that would be desired for the Reynolds Lab. Students and faculty were impressed by the many high-tech demonstrations on the trade show floor, as well as myriad poster and oral sessions. Most everyone had 'floating accommodations' as students rented small yachts across the harbor from the faculty who spent their nights on the Queen Mary, a rather unique hotel.

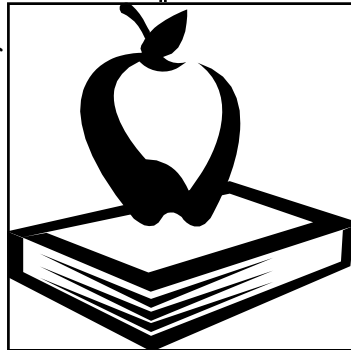
Course offerings by Mike included the usual, such as environmental geology, aqueous geochemistry, sedimentation and stratigraphy, but he also provided a

couple of new opportunities by offering specialized courses which were well attended. These included a course called Basin Analysis (offered in the fall) and a course entitled Illinois Basin Studies (offered in the spring). Both of these courses stressed the integration of tectonics, structural geology and stratigraphy. Students learned the basic physics behind basin formation in the Basin Analysis class, as well as the many types of sedimentary basins present globally. The Illinois Basin Studies course was a regionally focused course investigating the where and why of oil and gas production in the Illinois Basin, as well as a survey of classic oil patch areas, and paleogeographic considerations associated with the basin including topics ranging from cyclic sea level rise and fall to paleobotany and paleoecologic considerations.

The May family continues with the busy life of sports and school as usual (what else is there?). Beth has established herself as the foundational science teacher in the Bowling Green area as many of her St. Joseph Interparochial School middle grades students end up doing quite well in high school. She continues to spark

interest in science in the hearts of young folk. The youngest of the May boys, Kevin, spent about six months as a junior in high school exchange student in Gorlitz, Germany (think Pilsners, Czech Republic, and Poland borders here). He thoroughly enjoyed the adventure, picked up the language to be conversational and has host parents that will be visiting Bowling Green this fall! In addition to traveling all around Deutschland, Kevin learned to downhill ski in the Alps in Austria, visited the Tuscan region of Italy, and he many times visited the Czech Republic and Poland. Older brother Peter meanwhile played soccer for a spring season for the University of Evansville and two clubs (United and River City Rovers Premier Development League) in Louisville through the summer. This included many games in the Midwest as well as Ontario. Peter is a sophomore at the University of Evansville this year and is enjoying the academics and the sports.

Dr May invites alumni or any interested party to visit the developing Reynolds Laboratory space. He guarantees that visitors will be impressed with the

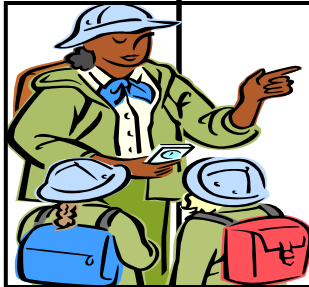


opportunity this lab will provide for both undergraduate and graduate students in the Department. If you would like to come by and see, or make a contribution for maintaining this space and expanding capabilities of the lab, please contact him at michael.may@wku.edu.

AMY NEMON notes that Fall 2012 marks the start of her eighth year teaching for WKU. She continues to be located in Glasgow, with outreach to other extended campuses and online courses. This past year she taught Geography of Russia, the first in the Department since the collapse of the communist USSR. Amy continues to teach World Regional, Geography of North America and Kentucky, as well as the first two levels of GIS classes for the department.

Amy continues being active on the Kentucky Geographic Alliance's (KGA) steering committee and has received another two-year appointment to represent the KGA at the KCSS (Kentucky Council for Social Studies) quarterly board meetings. Amy also was asked to serve on the Kentucky Geographic Names Committee (KGNC). Amy completed three environmental education graduate courses during the 2011/2012 school year, for fun. Classes like this continue to inspire her to inspire students to work towards a sustainable future. This school year Amy will be organizing a chapter of the WKU Greentoppers on the WKU Glasgow campus to continue the original group's goals for the University and community towards a greener more sustainable future. They will kick off with a rain barrel and water conservation workshop on November 9th to highlight Geography Awareness Week. Amy also had a unique opportunity to co-coordinate the Glasgow campus convocation this fall with huge success!

Amy continues to be one of the lead event planners for the National Geographic State Bee and will take over as the state coordinator in 2014. This spring will be the 10th year the event has been held in Bowling Green at the Knicely center, (the 24th year of the event). It was very exciting to see so many students, from around the state, who were very geographically aware! The turnout of colleagues from the Department helps to make this a very successful even each year!



Amy's research interests are still strongly geared towards K-12 geography education. She would also like to spend time researching health/disease issues in Kentucky and the United States. Particular interests include the location of Kawasaki Disease (a children's disease) outbreaks around the country to uncover patterns.

LESLIE NORTH had a productive first year in the Department, and still managed to relax and spend quality time with her family, friends, and five chihuahuas. She was named the Associate Director of Education for the Hoffman Environmental Research Institute and Director of the Karst Field Studies Program this year, and is honored to be trusted with continuing the program's 30-year legacy. Leslie was also involved with ten grant/contract submissions, seven of which were awarded from myriad funding agencies. One of the most exciting of these contracts is with the Habitat for Humanity Durbin Estates, a small green community being built in Bowling Green, to develop a series of interpretative signs about the green infrastructure in the community, a website with language translations to accommodate local ethnic residents, a brochure summarizing the goals of the community, and a series of student activities related to green infrastructure for use at a nearby elementary school. This project should result in increased public knowledge and support of green infrastructure, karst environments, and valuable water resources.

Leslie also volunteered her time to assist and oversee the development of an educational children's activity book focused on karst terrains, titled *Karst for Kids: Barbados Adventure*, by graduate student and Hoffman staff member Jonathan Oglesby. This book will become part of a significant series of children's educational materials, which feature its two characters, Grantley and Lucy, traveling around the globe to explore and learn about the vast world of karst. She also spent time this year collaborating with the WKU Office of Sustainability to produce an interactive iBook about the Office's programs and other WKU sustainability initiatives. Undergraduate student, Mr. John Perry, and Mr. Oglesby, will complete the book during the 2013 academic year. She and the staff of the Hoffman Institute are anxious

to see the launch of this unique book and discover what other exciting outreach projects may be on the horizon.

With student engagement, collaboration and, of course, travel opportunities in mind, Dr North attended professional meetings (Association of American Geographers, Geological Society of America, Southeast Division of AAG, The \$100 Solution, Kentucky Academy of Sciences) during the 2012 academic year. At these meetings she presented multiple papers/posters and participated in the development of several additional presentations with fellow colleagues, WKU graduate and undergraduate students, and Hoffman Institute staff members. Aside from attending presentations, Dr North enhanced a collaborative relationship to strengthen the Karst Field Studies program, developed plans to host a karst education workshop at the 2014 National Speleological Society annual convention, initiated an undergraduate research project related to water resource sustainability, and revitalized a million-dollar grant proposal to create a Great Karst Trail, through discussions with her colleagues at these annual meetings. At the annual SEDAAG meeting she was also appointed to the editorial board of *Southeastern Geographer* and surprised with a Service Award in recognition of four years of service to this journal. Staying true to the field of geography, she also managed to find time during these events to explore the wonderful host cities of New York City, Savannah, and Minneapolis with fellow Department faculty and students!

Dr North began the year spending time in Barbados to cultivate a research project on Harrison's Cave and wrapped up the academic year at the *National Science Foundation Early Career Geoscience Faculty Workshop: Teaching, Research, and Managing Your Career* in Williamsburg, VA. During this workshop, participants engaged in discussions and activities related to effective teaching strategies, course design, establishing a research program in a new setting, working with research students, and balancing professional and personal responsibilities. The workshop concluded with a productive trip to the National Science Foundation



headquarters outside Washington, DC to meet with program directors.

As she begins her second year at WKU, Dr North is looking forward to applying teaching techniques and research strategies learned at the aforementioned workshop, continuing her travels in the states and internationally, and spending more time creating great memories with friends and family!

JASON POLK has had a busy and productive year working on research projects, teaching courses, engaging students, and traveling. He spent time caving, biking, and took a break from house projects this year due to such a busy schedule, but kept occupied with many other adventures!

Dr Polk taught several courses this past year, including a Karst Environments course that focused on caves, springs, groundwater, and other aspects of karst landscapes, which also had a fieldtrip to the Ozarks to learn about karst landscapes in different regions. In addition, he helped to welcome new students to the recently developed Karst Geoscience undergraduate geography track. Dr Polk also graduated two Geoscience students: Sean Vanderhoff, whose thesis focused on storm-driven contaminant transport in south-central Kentucky; and Celia Davis, whose thesis focused on spatial analysis of the spread of White-Nose Syndrome, a deadly disease affecting bats in the US.

Dr Polk continued to be involved in various research and scholarly activities, including advising the Green River Grotto student organization, which has been very active recently in local cave survey and exploration. Members attended the National Speleological Society's annual conference this past summer, with some winning awards for cave cartography and presentations on karst research. Additionally, over the past year, Dr Polk and his students gave over 25 conference presentations at local and national meetings, including the Geological Society of America, Kentucky Academy of Science, and the Association of American Geographers.

This past year, Dr Polk also engaged in myriad activities related to service and outreach with

students, including hosting two workshops in Florida with the Southwest Florida Water Management District on groundwater awareness, and establishing an outreach campaign with Hoffman Environmental Research Institute staff and students that produced an interactive website, *UnderFlorida.com*, that allowed people to learn more about Florida's karst aquifer. Following this, the City of Bowling Green also partnered with the Hoffman Institute to raise karst groundwater awareness, resulting in a productive collaboration to create signage, infographics, videos, and a website to begin a long-term groundwater awareness campaign. Learn more at *UnderBGKY.org* and take the pledge to protect our groundwater! These themed campaigns are part of a larger initiative by the Hoffman Institute to connect together similar areas in protecting groundwater resources.

This summer, Dr Polk met with Mr. Philip St. Hill, Chief of Protocol for the country of Barbados, about establishing linkages between Bowling Green and the city of Bridgetown, Barbados, toward a larger partnership on groundwater awareness. Along those lines, Dr Polk also worked to finish a next phase of developing an online tool for evaluating human impacts on karst landscapes, a project started with former Gatton student Victoria Allen, who now is starting a degree program at the University of Louisville. Visit *ukarst.com* to check out the beta version of this site and enter information about your own karst landscape! Together with students, staff, and colleagues, he is excited by the Hoffman Institute's growing synergistic educational and research programs around the globe and eager to continue creating opportunities for students to be involved in these activities.

Continuing to delve into his research, Dr Polk performed fieldwork with several grad students during the past year, including two trips to Barbados with grad student Gil Ouellette to work on a paleoclimate reconstruction of precipitation in the region using cave deposits, and to train guides at Harrison's Cave to assist with water sampling. He also traveled to

Belize with grad student Nick Lawhon and Hoffman staffer Ben Miller to continue collaborative research on droughts and the Maya collapse from cave sediments. There, the team mapped several caves and worked with colleagues from the University of Georgia and the University of South Florida on developing multiple geoarchaeological records of vegetation and land use change at the nearby Minanha ruins. Dr Polk, his students, and the Hoffman Institute stayed active this past year, submitting several collaborative and individual proposals that were funded by a variety of agencies. One major initiative was hosting the executive directors of the Caribbean Community Climate Change Centre, which is responsible for climate change science and policy in the Caribbean region, for a planning meeting to develop collaboration and proposal on several fronts related to water resources and climate change in Caribbean karst regions. Dr Polk will travel to Belize

in September to meet with these colleagues to continue discussions and develop collaborative projects.

In his spare time (what little there was!), Dr Polk worked to finish a book chapter on caves and karst in Florida for *Coastal Karst Landforms* to be published by Springer

this coming year. He also has several other manuscripts underway, and is actively working to develop new research projects for his students. Next summer, he hopes to lead a course on the Semester at Sea program and visit Europe for fieldwork and the International Congress of Speleology meeting in Brno, Czech Republic.

Now entering his fourth year, Dr Polk is settling in nicely and hitting stride for another busy and productive year. He is excited to continue the projects already underway and work with new students eager for adventure and science. He looks forward to strengthening collaborations and contributing to the Department's overall success and productivity. To balance out all the work activities, Dr Polk also plans to do some personal travel with his wife Leslie, finish



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a few house projects, and begin studying kung fu. He looks forward to a new and exciting year, and wishes everyone the best in their adventures!

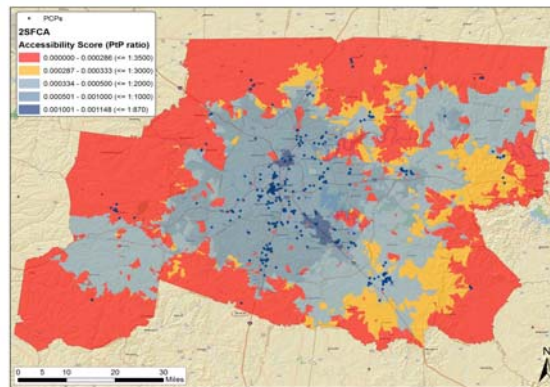
FRED SIEWERS enjoyed a productive and satisfying year in the Department. He taught his usual suite of courses, including Earth History lecture and lab, Introductory Field Techniques, Invertebrate Paleontology, his Winter Term Geology of the Bahamas course, and the Professional Preparation capstone course. His Field Techniques course was noteworthy due to the sheer number of students enrolled (28 for weekly field outings!) and the introduction of a new weekend field trip to explore the wonderful Upper Paleozoic geology of the Nolin River Dam area, Edmonson County, KY.

His fifth offering of the Geology of the Bahamas course (16 students) was, like previous offerings, an engaging, fun-filled, work-hard/play-hard experience that introduced students to the many geological and cultural wonders of San Salvador Island, Bahamas. The Professional Preparation course brought a number of program graduates back to the Department to talk about life after WKU and their professional endeavors and accomplishments. Program graduates speaking to this year's Professional Prep class included Ryan Hart ('11), Heath Dame ('09), David Doyle ('91), Adam Wanta ('08), and (once again) Bo McCue ('10). All and all, it was an excellent year with many memorable teaching and learning experiences by everyone involved.

Dr Siewers continued his efforts to get students to professional conferences through a "course enhancement" professional development program. In this program, students built upon their upper-level course work by participating in class-related technical sessions and then writing about what they learned in those sessions in post-conference assessments. This year's conferences included the GSA national meeting in Minneapolis, with 11 students participating, and the AAPG annual meeting in Long Beach, CA, with eight students participating. Students came away from the conferences with a real appreciation of the

professional world of geology and the technical sophistication of the science. Students attending the AAPG meeting, in particular, were blown away by the exhibits and the opportunities currently afforded by the petroleum industry (one student was even offered a job!).

In addition to these teaching and learning endeavors, Dr Siewers began working with two graduate students in the Department. One student, Rachel Bowles, is studying ostracods (tiny, bivalved crustaceans) from Bahamian saline lakes to see if their shell morphology and chemistry record varies in lake water salinity. Another student, Andrew Reeder, is developing a three-dimensional GIS model of the Mississippian-Pennsylvanian unconformity in south central Kentucky. Both students had excellent first years with significant advances on their research programs and graduate careers.



Dr Siewers continues to be actively involved in a number of curricular and programmatic initiatives of the Department. He is excited about the coming academic year when, during the Fall semester, he will be a visiting faculty member at Harlaxton College, Grantham, England. He will be joined by his wife Helen, the WKU campus landscape architect, and his two daughters who will be attending British public schools (uniforms and all!). Feel free to contact Dr. Siewers at any time (fred.siewers@wku.edu) or to "friend" him on Facebook. He loves keeping up with program graduates!

ANDREW WULFF continued to develop undergraduate research opportunities, be involved at a high level in field-based geology research and learning, and augmenting the analytical side of "hard rock" geology at WKU. Andrew and his students were active at professional meetings, as they combined for nine research presentations at regional to national scientific conferences. Andrew is currently supervising undergraduates working on projects including igneous petrology/geochemistry, characterization of ore suites, models of ore

petrogenesis, geothermobarometry of high-grade schists, drill rig standard operating procedures, and the use of Raman microscopy and electron microprobe to elucidate zoning profiles in minerals. Having good analytical facilities leads to so many exciting research experiences for our students!

WKU has initiated a new program for funding competitive undergraduate research projects. The FUSE program (Faculty Undergraduate Student Engagement) provides monies for research and travel to conferences to present results. Jason Howard, Taylor Hancock, and Clara Jones all wrote successful grants (totaling approximately \$11,100) and will be working with Andrew on aspects of gold deposits. Jason just returned from a week on-site in Nevada where he was met by alum Amanda Mullen (now Norfleet). Many thanks to both Amanda and her husband Daniel for a warm welcome and an invigorating week of introduction to large-scale gold mining! Andrew and Mike May combined on several internal grants totaling \$28,115 for the development of a high-end computing facility, renovation of the existing computer modeling facility, and industry-standard software (e.g. Petra and Vulcan). The Geology program also was able to purchase a new student Leica petrographic microscope. Many of these initiatives are designed to provide practical training and experience to further prepare our undergraduates for successful entry into their professional careers.

Student interest in mining and resource exploration was the impetus for a new course in Economic Geology in the fall semester. All the students modeled exploration techniques by characterizing ore samples from different locales, and studied models of ore petrogenesis. If you have access to ore samples, please consider sending them to us for analysis in this course. Several alums have already sent boxes of ore from various locales that have been amazingly useful – Thank you!

Dr Wulff also taught Structural Geology for the second time at WKU and thoroughly enjoyed both the students in the class and the great help from undergrad TAs Michael Powers and Stuart Kenderes. Thank you gentlemen! Dr Wulff worked again on the federally-funded EARTHSCOPE project with folks at Illinois

State University, leading workshops which develop the principles of magma generation along volcanic arcs, and eruption prediction techniques.

Andrew once again taught three weeks of the summer field geology course with students from fourteen universities (see story and photo in this edition). Once again, students unraveled the geology of Montana, Wyoming, and South Dakota – and braved lots of snow, some sleet, wind, dense fog, dry dry days, and even occasional beautiful weather this year. In short, it was a typical great field camp. WKU geology majors again represented the program well, with two “A”s and a nomination for a USGS/NAGT internship. Strong performance in the field course leads to these great “door-opening” internships. Thank you everyone who has financially supported our many field-based opportunities, which develop our students so that they can earn such great recognition, and get a jump-start on professional careers!



Dr Wulff is serving another three-year term as a national Councilor in Geosciences for the Council on Undergraduate Research (CUR), and looks forward to his annual visit to legislators in Washington in September to advocate for increased funding for the geosciences. His three years of service on the university-wide General Education Review Committee produced a new General Education program at WKU. Now to implement it! Dr Wulff is committed as ever to bringing more earth science to the K-12 classrooms in the area and he and his students contributed approximately 1350 “contact hours” with students (primarily 4th, 5th, and 10th graders) at schools in the Bowling Green area this past year. Andrew continued to train geology majors to help present aspects of geology to students at area elementary and high schools and become more involved in the community. Topics included the wonders of rocks and minerals, aspects of structural geology, geological hazards, maps, earth resources, groundwater, and limestone dissolution.

Andrew enjoys the challenges of identifying rocks and minerals brought to the Department by folks from all over the area, which this year included proposed meteorites, sedimentary iron deposits, carbonates of all sorts, fossils, artifacts, and various ores (from New

Mexico, Honduras, Nevada, Arizona, Oregon, and even Kentucky!). If you have samples or questions – bring them in! He continues to be involved in the community as a certified Community Emergency Response Team (CERT) member, giving interviews on radio and TV, and giving presentations on earthquake preparedness, and radon analysis and mitigation. Both kids are playing several sports and taking piano and cello lessons, with many additional activities to keep Dad running – and young (or so they say!).

JUN YAN was very productive research wise during the past academic year. His paper titled “Bicarbonate daily variations in a karst river; The carbon sink effect of subaquatic vegetation photosynthesis” was published in an international journal, *Acta Geologica Sinica*; it explores the influence of subaquatic vegetation on the carbon cycle. Another paper titled “Detecting Traffic Accident Clusters with Network Kernel Density Estimation and Local Spatial Statistics: An Integrated Approach” is currently under review by the *Journal of Transport Geography*. Dr Yan is also working on a paper co-authored with his advisees, Dr Donna Renaud and Mr. Huajian (Thomas) Zhang. The paper investigates the assimilation process of Iraqi and Burmese refugees in the Bowling Green area. Dr Yan advised several M.S. students, and one of them is scheduled to defend his thesis in October. Brandon Fowler’s thesis examines the issues related to violence in Colombia using GIS and advanced spatial statistics.

In the past year, Dr Jun Yan taught several upper-level GIS courses, including GIS Programming, Urban GIS Applications, Spatial Databases, and Geoscience Statistical Methods. In the GIS Programming class, students learned in depth some advanced geoprocessing techniques with both ArcGIS ModelBuilder and Python scripting, while in the Urban GIS Applications class they worked on a number of real-world projects, including assessing the response times of fire stations in Bowling Green, selecting a new site for a fire station, redrawing school attendance zones, and redistricting voting precincts, etc. Through these projects, students gained invaluable experiences on how to plan and implement a GIS project independently. Dr Yan takes great pride in his students’ accomplishments.

ALUMNI CONTRIBUTIONS

Contributions to the Department of Geography and Geology Development Fund in 2011-2012 stayed steady during the year, a reflection of the tough economic times we face. The number of individual contributions to our Fund exceeded the 110 mark! Thanks to everyone for helping us achieve our goals this year; we were able to support several students attending conferences, conducting research, and participating in study abroad and study away (U.S.) programs. Your generous contributions go a long way to ensuring that we have sufficient supplies and equipment for student use. When you receive a call from students, or whenever the spirit moves you, make a contribution to the Department and to the University. Be sure to specify that the money be designated for use by the Department of Geography and Geology. Our profound thanks to our contributing alumni. We gratefully acknowledge gifts from:

Janet G. Bemiss
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	<i>Special thanks to the Leigh Roy Bell Estate</i>
	<i>Special thanks to Dr. Jim Davis</i>
	<i>Special thanks to Bill and Amy Rich</i>
	<i>Special thanks to Syed Reza Ahsan and family</i>
<i>Special thanks to William Dost for ongoing support of the Geology program</i>	<i>Special thanks to the Richard S. Reynolds Foundation and William Florman</i>
<i>Special thanks to the Gildersleeve Family</i>	<i>Special thanks to the family of James and Avo Taylor</i>



Fill out the Alumni Information sheet on the next page and mail it to the Department today. We want to know how your career and life are progressing. You can also attach a small passport-sized picture of yourself, if you like, that we can publish alongside your news.

“I predict a fantastic 2013 if you send in your Alumni Information sheet right away.....”

ALUMNI NEWS

Almudaris, Sami (M.S. Geoscience 2011) is employed by Saudi ARAMCO as a Senior Digital Cartographer stationed in Dharan.

Bedel, Tony (Meteorology 2010) completed the M.S. Geography program at the University of Georgia in Spring 2012 and has accepted the position of Environmental Technologist at the Division of Air Quality, Commonwealth of Kentucky.

Beyer, Chandra (Geography 2002) retired from the U.S. Army and is pursuing graduate studies in St. Paul, Minnesota.

Blaylock, Ian (Meteorology 2012) accepted the position of Forecaster for the Corpus Christi, TX, National Weather Service office.

Calhoun, Gilbert (Geography 1955) is retired from the U.S. Central Intelligence Agency.

Coyle, Brad (Geography & Geology 2000) recently accepted a position with Big Rivers Electric based in Henderson, Kentucky, where he'll serve as the Manager of Environmental Services

Elder, Courtney (Geology 2011) is an Analytical Lab Technician at Swedish Match in Owensboro. She notes that the professional preparation course and her lab skills and experiences impressed the company.

Gilliland, Josh (M.S. Geoscience 2011) is pursuing his Ph.D. in climate at Louisiana State University.

Goldsmith, Jeremy (Geography 2008) joined the Peace Corps after graduation and has recently completed a two-year stint in The Gambia. He plans to attend graduate school back in the U.S.

Horn, Dustin (GIS 2012) is a GIS Analyst at the Green River Area Development District (GRADD).

Littell, Ashley (M.S. Geoscience 2007) recently married Adam Hitt (Geography 2006). She still re-

members “fondly” Dr. Keeling’s infamous “10-minute” walks on study abroad programs.

Mattingly, Kyle (Meteorology 2012) has enrolled in the M.S. Geography program at the University of Georgia.

Montgomery, Josh (GIS 2012) has been hired as a GIS Project Manager for WKU’s Planning, Design, and Construction department.

Payne, Matt (GIS 2011) works for ESRI in Redlands, CA, as a Desktop Software Analyst.

Rutherford, Chris (Geology 1987) is a geologist with the Sanders Lead Company in Alabama. He continues to research groundwater remediation of metals with sulfate-reducing bacteria.

Sowers, Justin (GIS 2011) works for Michael Baker Corp. as a GIS Analyst with Public Works at Ft. Polk Army Post in Louisiana.

Sprowl, Stephanie (Geology 2012) has been hired by the Department of Transportation as a Transportation Engineering Assistant.

Tobin, Ben (M.S. Geoscience 2007) is pursuing his Ph.D. in Aquatic Resources in the Biology Program at Texas State University, San Marcos.

Vann, Barry (M.S. Geography 1990) is Director of Community and Higher Education and Professor of Geography at the University of the Cumberland, Williamsburg. He thanks Stuart Foster and Conrad Moore for their help during his time in the program. His newest book is titled “The Forces of Nature: Our Quest to Conquer the Planet.”

Whiteley, Rick (Geography 2002) continues to pursue his interests in meteorology, and thinks the Moody Blues should be inducted into the Rock and Roll Music Hall of Fame!

Woodall, Tommy (GIS 2012) is a Campus Infrastructure and Data Specialist with WKU’s Facilities Management department.

Zimmer, Connie (Geography 1972) is Associate Professor of Secondary Education at Arkansas Tech University. She remembers Jim Bingham fondly.



Homecoming October 2011



GEOGRAM is designed, edited, and produced for the Department by Dr David J. Keeling.

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<http://www.wku.edu/geoweb>

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(include maiden name)

Major _____ Year of Graduation _____

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