


Fall 2010

Geogram 2010

David J. Keeling Editor
Western Kentucky University

WKU Department of Geography and Geology

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GEOGRAM



Fall 2010



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 2009-2010. Highlights of the year's accomplishments included the following events and activities:

► Geography (Environment and Sustainability) major Joey Coe has been awarded a Moe Udall Scholarship for the 2nd successive year.

► MS Geoscience graduate Ronnie Leeper's thesis on land cover and soil moisture in Western Kentucky has been published in the Publications in Climatology series by the University of Delaware

► Dr Chris Groves was recognized as Ogden College's Outstanding Public Service Scholar for 2009-2010, and was named a University Distinguished Professor

► The Kentucky Mesonet reached 50 active stations, and received a 'Best of Kentucky Technology' Award from the Commonwealth for "Best Application Serving Public Agencies."

► Geology major Stuart Kenderes received the Mary Angela Norcia Award from the WKU Student Government Association in recognition of campus leadership and for exemplifying "The Spirit Makes the Master."

► Dr. Rezaul Mahmood was appointed as Editor of *Earth Interactions*, a peer-reviewed journal jointly published by the American Geophysical Union, the American Meteorological Society, and the

Association of American Geographers.

► Four GIS students received ESRI scholarships, the ninth year in a row for the Department.

► Drs Peggy Gripshover and Tom Bell were named co-editors of *FOCUS on Geography*, an international journal of the American Geographical Society. Dr Bell is an Adjunct Professor in the Department.



A Letter from the Department Chair

► Fourteen geology majors studied the geology and natural history of the Bahamas islands during a Winter term study abroad field course led by Dr Fred Siewers.

► Geology major Matt Downen presented his research at the annual Posters at the Capitol event in Frankfort

► Three Meteorology majors and one Geoscience student received prestigious NWS S.C.E.P Internships.

► Meteorology major Kyle Mattingly was awarded an E.F. Hollings Scholarship with NOAA

► 14 students (11 undergraduates) presented their research at the WKU Research Conference in March. Geoscience graduate student Ann Epperson won the graduate social science division of the WKU Student Research Conference

► Students and staff from the Hoffman Institute participated in a workshop and exchange signing ceremony at Shilin Stone Forest in southwest China

► Geoscience graduate student Erin Greunke organized and convened the first WKU Study Abroad and Global Learning Symposium in April.

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► Dr. Aaron Celestian was selected as the first Director of the Advanced Materials Institute in Ogden College

Faculty and students excelled again in scholarship, research, and professional development, convening and/or participating in myriad professional workshops and presenting about 50 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, six faculty reviewed manuscripts for academic journals or publishers, and geography and geology faculty research articles appeared in such diverse journals as *Journal of Hydrologic Engineering*, *International Journal of Coal Geology*, *Progress in Human Geography*, and *International Journal of Climatology*, among others. About 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 2010, the Department recorded 137 majors in geography, meteorology, and GIS; 73 in geology; and 60 total minors. The Department graduated 36 students from its major programs during the year and it has a target of 45 new majors each year to maintain and grow the programs.

The students and faculty of the Department of Geography and Geology again have demonstrated excellence in 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 30, 2010

** Special Event: Geography and Geology Departmental Tour (Including our GIS lab, MESONET, and Applied Research Centers).

Time: 10:00 - 11:00am

Location: Meet on 3rd Floor EST Building

** Special Event: Homecoming Tailgating

Time: 11 a.m. - 2 p.m.

Location: DUC South Lawn - Join us at the

Geography and Geology Alumni Tent.

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

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

The Department website homepage continues to be revamped, with fresh material, new links, updated pictures, and more information about programs. In addition, the geology program has developed its own website with information about the major options, faculty research, student opportunities, and other information. Dr Aaron Celestian is the webmaster and you can view the page at <http://www.wku.edu/geology/>.

Archived information about the Department's news announcements and other publicity can be found on the website at <http://www.wku.edu/geoweb/info/newsarchive.htm>, where news reports are listed by month. There is also a link 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/info/facpubs.htm> 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 go online and fill out the electronic form:

<http://people.wku.edu/david.keeling/files/geomail.htm>

Outstanding Geography and Geology Students, 2009-10

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. The recipients of the Department's highest honors also receive recognition at the annual Ogden College Awards Ceremony.

For the 2009-10 academic year, Andrew Reeder received the Outstanding Geology Senior Award, presented by Dr Andrew Wulff. Sara Ferguson received the Ronald R. Dilamarter Outstanding Senior in Geography Award, presented by Dr David Keeling. Scot Russell received the Outstanding Geoscience Graduate Student award, presented by Dr Lee Florea. Astrid Suarez-Gonzalez received the inaugural L. Michael Trapasso Outstanding Senior in Meteorology Award, presented by Dr. Rezaul Mahmood.



Dr Rezaul Mahmood presents Astrid Suarez-Gonzalez with the inaugural L. Michael Trapasso Outstanding Meteorology Student Award at the Annual Ogden College Awards Ceremony, April 2010



Dr Lee Florea presents Scot Russell with the Outstanding Geoscience Graduate Award at the Annual Ogden College Awards Ceremony, April 2010



Dr David Keeling presents Sara Ferguson with the Ronald R. Dilamarter Outstanding Senior in Geography Award. at the Annual Ogden College Awards Ceremony, April 2010

Congratulations to ALL



Geoscience Graduate Student Wins WKU Student Research Conference Award

On February 27, 2010, close to 100 undergraduate and graduate students met on WKU's South Campus to compete in WKU's fortieth annual student research conference. Students presented original research in paper presentation and poster formats, organized by broad disciplinary groups. In the social sciences division, Geoscience graduate student Ann Epperson took first place for her paper, "Internet GIS as a Historic Place-Making Tool for Mammoth Cave National Park." Ann detailed the creation of a web interface for a historical GIS of the national park region, part of a long-term research project initially developed by former graduate student Matthew Brunt and Dr Katie Algeo. The internet-accessible GIS disseminates information about the people and communities that resided in the region before the national park was created and includes 1930s-era photographs taken by a CCC photographer and details from the 1920 census. This information is geo-referenced to a hill-shaded topographic map, helping users visualize the pre-park communities. Take a look at the Mammoth Cave Historical GIS at: <http://161.6.109.206/MammothHGIS/>



Dr. Algeo presents the award to Ann Epperson

Op-Eds About Issues of Importance to Society

By David J. Keeling
Department Head

As a member of the American Geographical Society's Writers Circle, I continue to write commentaries about relevant social issues viewed from a geographer's perspective for publication in the local, regional, national, and international media. These Op-Eds have ranged from arguments about regional political alliances (see below), about transportation investment in the U.S., to global climate change's impacts in the Arctic region. Part of the mission of the American Geographical Society (www.amergeog.org) is to stimulate debate on issues of importance to society and to highlight a geographic perspective on such issues. Scientists too frequently are accused of failing to engage with public policy in a meaningful way (witness ongoing debates over global climate change), so writing opinion pieces for local newspapers is one way to encourage a dialogue about important social and political issues. Our hope is to encourage people to engage with these issues in their communities, thus helping to influence policies in a proactive way.

The following Op-Ed addresses the challenge of declining social and economic competitiveness in the United States. The long-term implications of this failure to consider America's core economic geographies could be disastrous for the future of our country. This Op-Ed appeared in a number of newspapers around the country, including the *Hawaii Reporter*

HOPE AND HOPELESSNESS IN AMERICA

These first decades of the 21st century likely will become known in the future as the time when the global power center finally shifted from the North Atlantic world to the Indo-Pacific world. Changing economic and political geographies spell the end of American global hegemony and a dramatic decline in the American way of life. While the U.S. might remain the sole military superpower for some time to come, its social and economic competitiveness has passed its prime. All the signs of decline are there for

everyone to see. The challenge for Americans is to address these changing geographic realities in ways that might preserve some vestiges of a once-dominant nation's quality of life.

The rise of China and India, for example, is driven in part by strategic investments in the key ingredients of socioeconomic growth. Building infrastructure and educating citizens are two critical areas where these emerging economies are outperforming the U.S. Indeed, by most international measures, the U.S. is below average or merits a failing grade on many important indicators of social wellbeing. America's education system is on life support. States have disinvested in schools and universities at alarming rates, and higher education students are burdened with skyrocketing tuition resulting in crushing debt burdens after graduation. Basic infrastructure is in dreadful shape across the nation. We have an aging air traffic control system stuck with 1950s technologies and mentalities, and highways, railroads, and electrical grids that are crumbling and substandard at best. The nation's electronic communications capacity and speed have been surpassed by many other countries.

Even more alarming, American democracy is in crisis. Congress might as well hang a banner over its entrance reading "abandon hope and civility all ye who enter!" The political system is hopelessly mired in self-destructive partisanship, with little meaningful legislation benefiting the country – notwithstanding the recent vote on health care reform. Tea Parties and Coffee Klatches will not help restore trust in a broken system, where demonizing other points of view and verbally trashing opponents have become acceptable discourse.

A deeper understanding of economic geography principles would highlight the fatal flaws in American society today. A successful manufacturing system requires the U.S. to make things that other societies want, at competitive prices. We do well in some areas, but the average hourly labor cost and regulations make us less competitive in the global marketplace. As consumers we demand high quality goods at the lowest possible price, and steadfastly refuse to consider the social and environmental costs of this unsustainable approach. We demand cheap gasoline but do not support alternative energy strategies, and we turn a blind eye to misguided policies in the Middle East that keep

the cheap oil flowing. China even surged ahead of the US in 2009 to become the leading investor in renewable energy technologies. Unfortunately, Americans cling stubbornly to outdated and underfunded social entitlement programs while decrying any attempt to raise taxes to pay for them. Rural and urban poverty are at epidemic levels, yet any attempt to achieve human equality is denounced as socialism or worse.

Will hope or hopelessness shape our future? Although the U.S. may have lost its global pre-eminence in many areas, there are still opportunities to restructure society to achieve a decent quality of life while staying competitive in the global economy. This requires politicians, business leaders, and ordinary people to understand how and why America's economic geography has changed. We need to admit that we have failed to address the basic challenges facing our society and that other countries are advancing by taking steps that we should have begun decades ago.

Only by admitting its national weakness can the U.S. find a way towards rebuilding its future potential. If we fail in this endeavor, future generations will look back on this decade as the beginning of the end of America's hegemonic glory

Geoscience Students Engaged in Water Resource and Petroleum Research

This past summer proved quite busy for geoscience graduate student Nicholas Lawhon and geology major Chasity Stinson. Since July, Nick and Chasity have worked with Dr Lee Florea, Assistant Professor of Environmental Geoscience, on research questions in Wayne County, in southeast Kentucky.

The purpose of their investigations has been two fold. First, both Nick and Chasity have undertaken a year-long study of the physical and chemical hydrology in the Redmond Creek sinkhole, the largest non-compound sinkhole in the Commonwealth. More than 43 known caves in this sinkhole convey waters from the surface through the ground to emerge at Sandy Spring, a historic source of drinking water for residents in the vicinity of Slickford. Collectively, the data they will gather from Redmond Creek should reveal seasonal cycles and links between climate patterns and groundwater chemistry in the karst of south-

east Kentucky

In a second study, funded by WKU Provost Incentive Funds, Nick and Chasity have gathered samples of widespread gypsum deposits in caves, and waters from petroleum seeps in surface streams. More recently, Chasity traveled to the University of South Florida in Tampa to analyze the stable isotopes of sulfur in these samples under the direction of Dr Jonathan Wynn in the Department of Geology. The goal of this research is to assess the interaction between shallow reservoirs of petroleum that are sulfide-rich and groundwater. This interaction may influence the development of pore spaces in the subsurface, and therefore the migration of oil in this petroleum reservoir that was a major national production reservoir in the early to mid-20th Century.

Nick and Chasity will continue work on these projects this fall and, with Dr Florea, will present portions of this research at the Annual Meeting of the Geological Society of America in Denver, as well as the meetings of the Kentucky Speleological Survey, the Kentucky Society of Professional Geologists, and the Kentucky Academy of Sciences.

Contact Lee Florea in the Department of Geography and Geology at 745-5982 or e-mail at Lee.Florea@wku.edu

A Class on Storm Chasing?

by Josh Durkee

Watching the skies hoping for what most people would consider a terribly frightening experience - a tornado dropping down from a thunderstorm - has been a passion of mine ever since my first encounter with a tornado at the age of four. Unlike most people, spring fever for me is the itch for severe weather and the excitement for mere thunder and lightning. I tend to enjoy rainy days more than sunny ones, because it demonstrates an uneasy atmosphere that is just trying get back into place per se. For me that is fun to watch!

When I arrived at WKU in August 2008, a number of meteorology students quickly approached me, asking about rumors of a class that would actually allow them to get college credit for chasing storms. Once I let the cat out of the bag that I, indeed, planned to put such a course together, I quickly realized the demand

for such a class. After a year of preparation, I started to advertise for this summer-term class during fall 2009. I have advertised for summer courses in the past, but this was certainly different. For this class, which I called, "*Field Methods in Weather Analysis and Forecasting*", I had to promote it honestly by saying some real Debbie Downer things such as: "You will be in a 15-passenger van for 12-15 hours a day for two weeks straight."; "Pack for one week and hope to have time for laundry during the second week."; "You will likely eat Subway sandwiches for lunch and dinner for many days in a row."; "After all that, we may come back home having only witnessed sunshine and local tourist attractions."; and "Oh yeah, it will cost more money than a traditional summer course." Even so, they were hungry for the opportunity, as three van loads of students were still knocking my door down saying, "Please take me!!" In the end I devised a rubric that helped me decide in a fair manner who would be joining us on the chase, and I ended up with an excellent group.

To the surprise of many, the focus of the class is not chasing tornadoes. Nor is it that I am a tour guide for the students so that they can simply kick back and lap up the scenery. This class is about forecasting severe storms at their precise locations and backing up the predictions by being at those locations in time to verify the forecast in person. This is an extremely challenging effort with which even the most seasoned storm chasers often struggle. Not all severe storms produce tornadoes. In fact, most do not so the odds of coming home with a tornado under your belt are generally not in your favor. Furthermore, who is to say that there will even be storms at all? Of course, you cannot find prolific storms in the Great Plains if you never head out to try, and that is what we did.

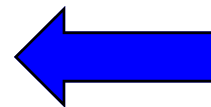
On a typical day, each morning the students would analyze atmospheric data and present hand-analyzed weather charts in a discussion about the expected severe weather for the given day, and designate a target town to drive to. After weighing in on each student's targeted threat area, off we would go. Along the way, the students would prepare a mid-day assessment and highlight any changes from the morning discussion. In the end, we traveled across 14 states (Kentucky, Tennessee, Mississippi, Arkansas, Missouri, Kansas, Colorado, Nebraska, Wyoming, Montana, North Da-

kota, South Dakota, Oklahoma and Texas) from May 20 to June 3 and racked up a total of 17 tornado touch-downs (in five states) across the 8,009-mile trek (a distance similar to driving from Bowling Green, KY, to Anchorage, Alaska, and back). As successful as we were, it was still very challenging, tiring, stressful, but also tons of fun. For the students this capstone course will forever remain a positive, learning experience. This was an incredible year to forecast and chase severe storms, and it will be difficult to match in the years to come. Regardless, we are already eagerly awaiting next year's chase.

In this photo taken by Dr Grady Dixon north of Boise City, Okla., near the Colorado border, the tornado in the background is just south of Campo, Colo., in the Comanche National Grassland. Back row (left to right): Dr. Josh Durkee, T.J. Malone, Landon Hampton, Olivia Payne, Sarah McCann; middle row (left to right): Sam Roberts, Brittney Whitehead, Dustin Jordan; front row: Kyle Berry.



Eight WKU students traveled across 14 states and witnessed 17 tornado touch-downs during a May term course. Dr Josh Durkee, who taught the course, took this photograph just east of Sheridan Lake, Colo. Back row (left to right): Sam Roberts, Sarah McCann, Dustin Jordan; middle row (left to right): Brittney Whitehead, T.J. Malone, Kyle Berry, Olivia Payne; front row: Landon Hampton.



Meteorology Student Awarded NOAA's Hollings Scholarship

Kyle Mattingly, a Western Kentucky University meteorology major and Honors College student from Owensboro, has been awarded an Ernest F. Hollings Scholarship by the National Oceanic and Atmospheric Administration's (NOAA) Office of Education. The Hollings Scholarship Program provides successful undergraduate applicants with awards that include academic assistance (up to a maximum of \$8,000 per year) for full-time study during the nine-month academic year; a 10-week, full-time internship position (\$650 per week) during the summer at a NOAA facility; and, if reappointed, academic assistance (up to a maximum of \$8,000) for full-time study during a second nine-month academic year.

The internship between the first and second years of the award provides the scholars with hands-on/practical educational training experience in NOAA-related science, research, technology, policy, management and education activities. Awards also include travel funds to attend a mandatory Hollings Scholarship Program orientation, conferences where students present a paper or poster, and a housing subsidy for scholars who do not reside at home during the summer internship.

"I feel very honored to receive this award and I'm excited about the opportunity to intern with one of the nation's most respected scientific organizations," Mattingly said. "This scholarship will allow me to deepen my understanding of the science of meteorology and it will continue paying off in the future in the form of graduate school and career options." Mattingly is a 2008 graduate of Owensboro Catholic High School.

"In his first two years at WKU, Kyle has become involved with the Meteorology Club and the Kentucky Mesonet and has excelled in the classroom," said Dr. Greg Goodrich, assistant professor in the Department of Geography and Geology. "The NOAA Hollings Scholarship is a great way to recognize the work Kyle has put in and will provide an excellent opportunity for him to explore research as a potential career."

The NOAA scholarship program has four goals: to increase undergraduate training in oceanic and atmospheric science, research, technology, and education

and foster multidisciplinary training opportunities; to increase public understanding and support for stewardship of the ocean and atmosphere and improve environmental literacy; to recruit and prepare students for public service careers with NOAA and other natural resource and science agencies at the federal, state and local levels of government; and to recruit and prepare students for careers as teachers and educators in oceanic and atmospheric science and to improve scientific and environmental education in the U.S.

"In only its third full academic year, the meteorology program has set a standard for excellence in learning, research, and service that reflects the dedication and hard work of students and faculty alike," said Dr. David Keeling, head of the Department of Geography and Geology. "With scholarship awards such as this, and the placement of our students in high-profile and competitive internships and graduate programs, the meteorology major is fast becoming recognized as a program of distinction around the region."



Nepal - An Endless Journey

By John All

I came to Nepal with a simple goal. I wanted to study the impact of global climate change on mountain vegetation. Globally, climate change is affecting mountains more than any place other than the polar regions, and it seemed simple enough that the world's biggest mountains would receive the greatest impacts. I have studied mountain climate change all over the world by using a simple formula - examine vegetation

change in national parks and see how these changes are correlated to climate patterns. Why national parks? - Not just because they are beautiful and fun places to work! National parks are protected and so human influences are limited. Generally, without some unusual circumstance like insect outbreak or fire, if vegetation change occurs the change is almost invariably due to either anthropogenic disturbance (grazing, agriculture, forestry) or climatic variability. National parks effectively remove one of these variables from consideration and this has proven to be an effective tool across the world.

When I arrived in Nepal with my wife Narcisa, I co- led a trip with nearly 30 Tribhuvan University (TU) Master's of Botany students to Langtang. Narcisa and I taught them to use remote sensing and GIS technologies in the field while learning plant species names and distributions for this part of the world. You can imagine my dismay when the first day in the park we hiked only through clear-cut forest! I learned that within the park were areas called buffer zones that allowed people to exploit the land in an effectively uncontrolled manner. Unfortunately the only areas in the parks that are not buffer zones are the steepest cliffs and the glaciers!

The second day we reached some remnant forest and it was lovely. A normal tourist would have thought it pristine. As an ecologist, I saw the logging trails crisscrossing the forest floor just off the main path. I saw that nearly all of the big trees were now big stumps and that the canopy was filled by fast growing 'weed' species of tree. I saw that a canopy that should be covering the sky 100% (competition for light in a forest is the most intense as light is the most vital resource, the only natural opening in a canopy ever is from an old dead trees falling - and new trees eagerly spring up to use that light) instead only averaged 40-60%. There were woodchips everywhere and new buildings (built of wood naturally) being built everywhere.

After two days of hiking through this degraded forest, we increased in altitude enough to reach a tree line. Only it was a false tree line; the tree line was not created by altitude but by terrain – i.e. it was flat. How does flat terrain create a tree line? When millet, mustard, and other crops are planted, trees disappear. We had reached a series of villages engaged in agriculture that had finally spelled the end for the forest. After a

day of walking higher and higher through agricultural fields – it still shocks me to think of agriculture in a national park - it grew cooler and cooler so that the fields disappeared. Ah, 'finally' I thought, now we will see some undisturbed vegetation. Then the yaks appeared, and naks (female yaks), and cattle, and yak/cattle hybrids, and sheep, and goats. Again, to a tourist it would have appeared as an idyllic pastoral scene of soaring mountains and soft bells ringing in the breeze from the gently grazing animals. To someone trained in resource management, it was a devastated wasteland - biomass grazed down to the dirt, plants eaten prior to seeds being set so that reproduction is inhibited, topsoil eroding off the hill slope in vast sheets, eutrophication in all of the streams from yak dung nutrient enrichment, total species depletion across the taxa, etc. To say I was stunned is a vast understatement. It was some of the worst overgrazing I have seen anywhere in the world - heretofore, private lands were the only ones hammered like this - never national parks. I have since found these extreme adverse grazing impacts to be well-documented by Nepali and foreign scientists for Langtang in journals like *Conservation Biology* - due to their negative impacts on Red Panda habitat.

After this harsh introduction, I now realized why there have been no field-based studies of vegetation and climate change in Nepal - because the human impacts dwarf any climate impact. But I thought the problem was the park I studied - Langtang is close to the capital, is home to a major Hindu holy site, and is visited by thousands of pilgrims a year, there are numerous 'buffer zones' within the park itself and thus a large resident population within the park, and it is next to a major Tibetan trade route (with a new road being put in directly to Tibet). So maybe Langtang was an anomaly. Next we went to Sagarmatha (Mt. Everest) NP, reasoning that it is a World Heritage Site AND a sacred valley for Buddhists. It was the most likely to be protected of any place in Nepal. Instead we found the single most heavily grazed location I have visited anywhere on the planet. To a biogeographer, it looks like atomic bombs have been dropped repeatedly. There is some recovery in places - the Himalayan Foundation founded and funded by Sir Edmund Hilary has replanted thousands of trees - but overall the impacts are incredible. The lower Gokyo lakes are bright green from yak-dung enrichment, most hill-

slopes are now bare rock with tiny patches of top soil and shrubs clinging to a few locations, etc. The most important thing I learned is that while Buddhists hold all life to be sacred, plants are not included in this view of life somehow and thus are not sacred. Therefore they can be consumed by humans or yaks with impunity. There has been no formal religious linkage of ecosystem health to the sacredness of life, so overgrazing and the resulting devastation on wildlife habitat becomes an inconvenient loophole.

While there are regulations in place to protect the parks, everyone we interviewed (over 200 people total in several different regions) agreed that there was not even the slightest attempt to enforce the rules in the upper elevations, and that even if there were, they would probably be inadequate to protect the landscape. There are too many different users from different areas who all converge in the parks or protected areas, use them during the summer, and then return to their scattered villages (including across the border in Tibet). Without a strong national government, there is no one to create or enforce regulations. Most current park managers are political appointees who quickly move on to other, more lucrative government jobs and often do not even set foot in their parks, according to local interviews. So there is a frontier mentality of using resources quickly before someone else beats you to it that results from this lack of oversight.

After this setback, I decided that maybe Sagarmatha and Mt. Everest were too popular a tourist destination (thus encouraging more depletion to provide supplies for trekkers), so we went to more remote parks. My wife Narcisa accompanied me everywhere and helped take data and train students. We took 3-5 different students from the TU Master's of Botany program on each trip. We would spend 15-25 days trekking and collecting data in each park, with a minimum of 250 samples per protected area. The maximum is over 550 samples in Sagarmatha NP. Each sample is a measurement of vegetation species richness, canopy structure, grazing, and other human impacts, etc., for a 20m x 20m plot marked by GPS. We took 10 photographs and measured a total of 35 variables per site. On foot, we covered hundreds of kilometers of distance and thousands of vertical meters of elevation per trip. The work has been very intense but Nepal is unquestionably the most beautiful country on earth, so you like mountains it was a labor of love.

After Sagarmatha, we visited Makalu Barun NP, thinking it would be less visited and more pristine. But the Maoists used it as a stronghold and their philosophy requires them to destroy resources as a protest against central government protection of these resources. Next we tried Shivapuri NP and Pulchoki Protected Area in the Kathmandu Valley, but these have been clearcut so many times that there is little left to recover.

Chitwan NP had the same issue - too many clearcuts in the past. The vegetation now seems protected, but Mikania is an invasive species that is causing ecological havoc there. My wife and I have spent several seasons in Africa working in wildlife national parks (she is finishing her dissertation there) and so we were surprised to visit Nepal's premier wildlife park and find wildlife so scarce. The park protections clearly only extend to tigers and rhino. The deer that should be overrunning the park based upon their reproductive rates - as they do in all other wildlife national parks in the world, where they cause a great deal of problems for the vegetation - instead exhibited all of the classic behaviors of a species being heavily hunted. Seasonal local extraction is still allowed in the park, poaching is rampant, and there are both military bases and Maoist bases (supposedly) still in the park, probably both eating deer. In any extent, it was not the place to study climate change.

We also visited Manaslu Conservation Area, Annapurna Conservation Area, Sagarmatha again, community forests, and VDCs across the country. We have gone from 800 meters in elevation to 8,850 meters and climbed the steepest cliffs. Nowhere have I found enough undisturbed vegetation to study climate change. When I met another researcher who was trying to study climate change and vegetation in Langtang NP, I asked how she was correcting for the grazing impacts. 'Grazing?' she said blankly, 'I don't know anything about grazing, I am a Botanist. How do you measure grazing?'

While my endless search for a protected area within Nepal's protected areas continued, my research now shifted to park management. I taught the students not just how to use geo-informatics technologies, but how to conduct interviews of park personnel and local stakeholders within the parks on resource usage. I showed them how to evaluate grazing and timber harvest rates and determine soil erosion thresholds. They

now understand that a program like REDD - which promises to provide many benefits to Nepal - cannot possibly succeed until there is a national program of resource management and regulatory enforcement in place. Nepal's arguments over how and when its constitution is created may seem like an academic argument to some, but while these disputes linger, the national parks are suffering a slow death without national government protection.

What I find most surprising is that no one wants to acknowledge or even discuss these problems. Scientists, NGOs, donor agencies, Nepali government agencies, etc., all turn a blind eye towards these issues. 'Nepal is a special case' or 'Nepal is too poor to protect its parks' is what I often hear. But I have worked in parks in very underdeveloped countries like Bhutan, Honduras, Boliva, and Southern Africa - all on par with Nepal in GDP terms - and parks in all of these countries are at least officially protected even if adequate management funds aren't available and there is some poaching on the side. The de facto situation in Nepal is that parks are just a name to attract trekkers and don't truly incorporate any real ecological protections. Many parts of the world have programs to create limited local economic benefits as part of the resource management of parks. But in Nepal, the local economic interests are left unfettered while the ecosystem is plundered because of a lack of resource management. As with so many other things - Nepal is unique on Earth...

Groves Appointed University Distinguished Professor

Dr Chris Groves, an internationally renowned expert in hydrogeology and water resources, has been appointed as University Distinguished Professor at WKU. Chris is a professor of geography, director of the Hoffman Environmental Research Institute and director of the China Environmental Health Project. "I certainly appreciate the appointment," Dr Groves said. "Even though I work to coordinate various efforts, it's really with my colleagues and our students all working together on these projects that things happen."

Dr Groves and his students have worked on regional projects including many years of collaboration with Mammoth Cave National Park, and he has

worked to involve students in international projects and conferences in China, Vietnam, the Caribbean, Greece, Slovenia, and Switzerland among others. For the past 15 years, Dr Groves has worked with the United Nations Educational, Cultural, and Scientific Organization (UNESCO) on international efforts to study and protect karst water resources. Earlier this year he was nominated by China's Ministry of Land and Resources for the "Friendship Award," China's highest award for foreign experts working in country.

Dr Groves, who joined the WKU faculty in 1991, received his Bachelor's degree in geology and Master's degree in geography from WKU and his doctoral degree in environmental science from the University of Virginia. He has published numerous papers, book chapters, conference proceedings, technical reports and field trip guides; presented at 19 international, 65 national and 59 regional conferences; and conducted 33 seminars. In 2007, he became a part of the Million Dollar Grant Club at WKU and has reached more than \$4 million in external grant funding. Dr Groves' appointment as University Distinguished Professor continues until 2015



Dr. Chris Groves, an expert in hydrogeology and water resources, has been appointed as University Distinguished Professor. (Photo by J. Carl Ganter, Circle of Blue)

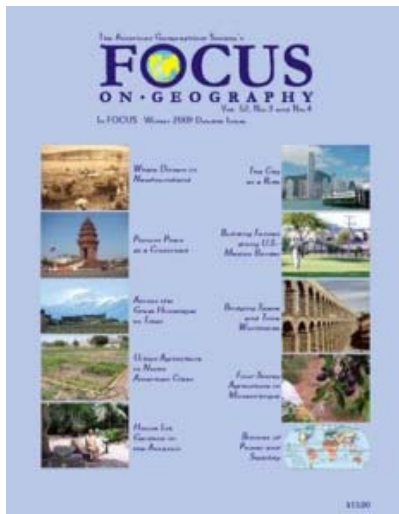
New Editors of *FOCUS on Geography*

Two WKU faculty members — Dr Margaret “Peggy” Gripshover, assistant professor of Cultural Geography, and Dr Tom Bell, adjunct professor of Cultural Geography — have been appointed as the new editors of the journal *FOCUS on Geography*.

Published by the American Geographical Society through Wiley-Blackwell, *FOCUS* is a 40-page, full-color quarterly journal with articles written by well-known academic and professional geographers, in-depth theme sections, maps and photos, and special country issues.

Written and edited by geographers, *FOCUS* has provided geographical analysis and perspective since 1950 in a relaxed and readable style for a wide audience that includes P-12 teachers, the business community, professional geographers, and the general public. The editorial team will produce four issues of the journal each year for the next three years.

Dr David Keeling, head of WKU’s Department of Geography and Geology and a member of the AGS Board of Councilors, noted that “Peggy and Tom were the unanimous choice of the editorial search committee, as they have significant academic publishing experience and are well known in cultural geography circles. The department is delighted to support them in this important endeavor and looks forward to a successful editorial experience.”



Geology Majors Study in the Bahamas

Fourteen WKU geology majors traveled to San Salvador Island, Bahamas, during the Winter Term for a study abroad field course on the geology and natural history of the Bahamas islands. “The Geology of the Bahamas” was led by geologist Dr Fred Siewers from WKU’s Department of Geography and Geology, with assistance from Dr. Lisa Park from the University of Akron. The purpose of the course was to study the modern environments of limestone formation and 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 a study of modern reefs and 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 and other archaeological sites.

Students participating in the course were: Rachel Bowles, a senior from Bowling Green; Keith Conn, a senior from Lewisburg; Matt Downen, a senior from Columbia; Courtney Elder, a senior from Owensboro; Stuart Kenderes, a junior from Independence; Kelsey Kidd, a junior from Bowling Green; Danielle Marsh, a senior from St. Charles, Ill.; Amy Matheny, a senior from Owensboro; Melanie Newton, a junior from Cocks Creek; Buddy Price, a junior from Dubre; Shelby Rader, a senior from Irvine; Heather Williams, a senior from Elkton; Josh Willoughby, a junior from Bowling Green; and Amber Yates, a senior from Bowling Green.

Dr Siewers said most students were amazed at the diversity of field experiences on San Salvador Island and were surprised at the remoteness and rugged beauty of the island. Many found the course to be a “life changing experience” that transformed the way they look at the natural world and modern society.

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. “Student engagement in a global context is exemplified by the department’s field camp and study abroad opportunities,” said Dr David Keeling, head of the Department of Geography and Geology. “Dr Siewers’ Bahamas experience is one of many exceptional field study op-

portunities provided for geology majors and is designed to expose students to practices and processes that cannot be experienced in a regular classroom.”

“This is a tribute to the community of activists we have on campus. This is not just me; it’s a movement of positive change.” In addition to Coe, WKU nominated Nicholas Asher of Elizabethtown and Hannah Morris of Bardstown.

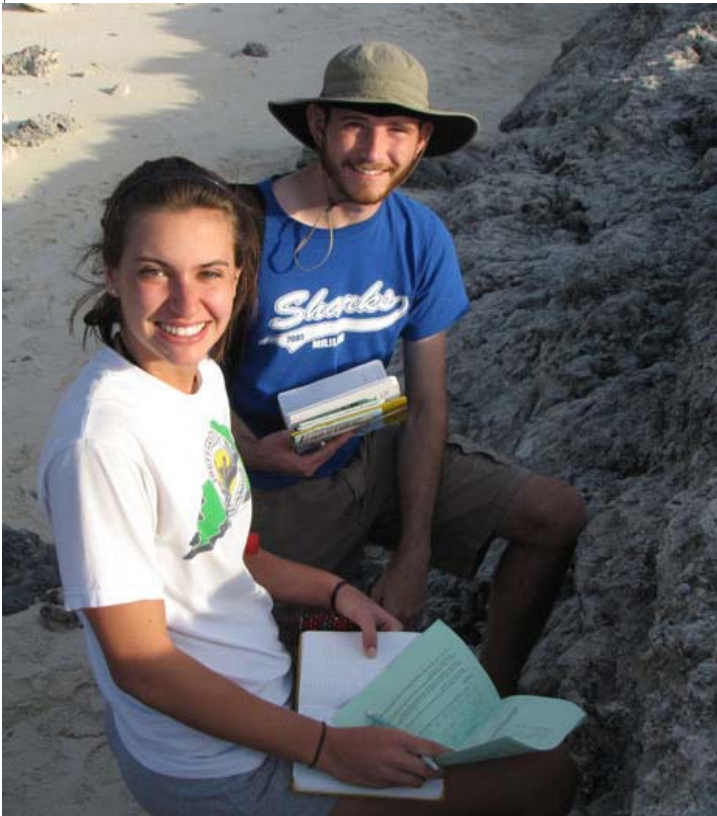
Amy Eckhardt, director of WKU’s Office of Scholar Development and faculty representative for the Udall Scholarship, said it was not common for the Udall Foundation to honor a sophomore because they usually do not have the demonstrated record of service and leadership with the focus on the environment that it takes. “Joey’s commitment to the environment has continued to deepen and evolve in the past year,” she said, and this demonstrated growth helped his second application be successful.

For Coe, having the Udall Foundation think he’s doing something worthy is both awesome and humbling. “I have a responsibility to continue the work I’ve been doing and to build on it,” he said. Coe used the first \$5,000 scholarship, along with a Travel Abroad Grant from the WKU Honors College and a World Topper Grant from Study Abroad and Global Learning, to participate in Semester at Sea, the only study abroad program of its kind in the world, in the fall of 2009. Using a ship as its traveling campus, students, faculty, and lecturers learn and reside together while fully circumnavigating the globe each fall and spring semester and exploring a world region each summer.

Working with Dr Bernie Strenecky, scholar-in-residence at WKU and Director of Service Learning for Semester at Sea, Coe helped form an environmental club aboard the ship and helped institutionalize service learning. They were able to implement environmental service learning projects “that had an awesome impact the communities we visited,” Coe said.

While participating in Semester at Sea, Congress began considering the American Clean Energy and Security Act. Although they had limited access to the Internet and email, Coe and the environmental club he helped establish orchestrated a lobbying campaign that resulted in 180 letters to senators supporting environmental legislation.

This global experience has enabled Coe to connect his environmental passions with his work on social justice and international development. Coe, an Honors College student and a Geography-environmental studies major, is an active member of the student envi-



WKU students Shelby Rader of Irvine and Stuart Kenderes of Independence participated in the Bahamas program.

Geography (Environment) Major named Udall Scholar

In 2009, William “Joey” Coe and Patrick Stewart became the first ever Udall Scholars at Western Kentucky University. Coe, a junior at WKU, has once again been honored as the only Udall Scholar from Kentucky in the 2010 competition.

Coe, the son of Bruce and Susan Coe of St. Matthews in Louisville, Ky., is one of 80 students from 63 colleges and universities selected by an independent review committee of the Udall Foundation. The selections were announced on April 8, 2010.

“There were a lot of very capable applicants from WKU and it’s an honor to be selected,” Coe said.

ronmental organization the GreenToppers and WKU's chapter of Americans for an Informed Democracy.

Also at WKU, Coe is working with Dr Strenecky and the new Institute for Citizenship and Social Responsibility at WKU on the Class Legacy Project to involve incoming freshmen in improving the quality of life in underserved areas of Bowling Green by tapping into their knowledge and ideas. "That fits into my style of environmentalism," he said. "It's about people. You have to be focused on the human being and help use natural resources to improve quality of life. It's not about saving a tree; it's about saving a person."



MESONET Installs 50th Station

The 50th station in the Kentucky Mesonet's weather and climate monitoring network has been installed at the Stearns Ranger Station on U.S. 27 near Whitley City in McCreary County. "We are extremely pleased to have a station in McCreary County as part of the Kentucky Mesonet," said Dr Stuart Foster, director of the Mesonet and the Kentucky Climate Center at WKU. "This site will provide valuable data to assist National Weather Service meteorologists in pro-

ducing forecasts and severe weather warnings, and will also provide benefits to a wide range of interests in the local area."

The stations collect real-time weather and climate data on temperature, precipitation, humidity, solar radiation, wind speed and direction. Data is packaged into observations and transmitted to the Kentucky Climate Center at WKU every five minutes, 24 hours per day, throughout the year and is available online at www.kymesonet.org.

The Mesonet's first station at the WKU farm in Warren County became operational in May 2007. The statewide automated environmental monitoring network supports a variety of needs across Kentucky in agriculture, education, emergency management, energy, engineering and construction, recreation, transportation, water supply management and weather forecasting.

Stations are located in Adair, Allen, Barren, Boone, Breathitt, Breckinridge, Bullitt, Caldwell, Calloway, Campbell, Carroll, Casey, Christian, Clark, Clinton, Crittenden, Cumberland, Fayette, Franklin, Fulton, Graves, Grayson, Hardin, Harrison, Henderson, Hopkins, Jackson, Johnson, Knott, Knox, Lewis, Lincoln, Logan, Madison, Marshall, Mason, McCreary, McLean, Mercer, Metcalfe, Morgan, Nicholas, Ohio, Owen, Owsley, Rowan, Taylor, Trigg, Union and Warren counties.

Site license agreements have been reached in Lawrence, Marion, Muhlenberg and Pike counties. Installation of a foundation for the Pike County station began this week.

Mesonet officials are actively pursuing sites in about 20 other counties, including Bath, Bell, Carter, Clay, Harlan, Hart, Pendleton, Powell, Pulaski, Rockcastle and Todd.



ADVENTURES IN GEOSCIENCE

CLIMATE CHANGE IN THE CENTRAL HIMALAYAS OF NEPAL

By John All

Mountain weather is often unpredictable, and the ongoing and future climate changes are likely to make things even more uncertain. These and other factors have made research in the Himalayas troublesome. In the past, field research could be timed with the monsoon—if you wanted generally clear weather, you would plan to go in October before conditions became too cold to work in. If you wanted to study wildflowers, you would go in July. Why July? The yaks move up the valleys in April, eating as they go. By June, they are in the higher pastures and the monsoon has begun and new growth springs up, especially in the lower elevations. In July the wildflowers are perfect. By September the yaks have begun moving down the valleys because of the increasing cold, and yak trains full of trekking supplies have begun to move up the valleys as the rains end. As a result, by early October the meadows are mowed flat, down to the dirt. A yak is a huge beast and when carrying heavy loads up steep slopes, it consumes many tons of biomass per year. Alpine meadows do not produce high amounts of biomass, so you end up with a paradoxical situation of both hungry yaks and totally depleted meadows.

With growing local populations of people and increased trekking, this ‘tragedy of the commons’ grows worse every year. Topsoil is slumping off the steep hill slopes in larger and larger sheets. Local water supplies have longer and longer periods of eutrophication created by yak dung (and human wastes) entering water bodies. But in a country with chronic underemployment and a GDP of less than \$1000 a year, any possible income means the difference between mere survival and actual prosperity.

Climate change has begun to rapidly impact the colder regions of the world. The reality of what is happening in many less developed mountainous countries is shocking—vast chasms in the country-

side comprised of loose rock - with such massive scars pointing out places where millions of tons of ice recently existed. When you ask the local villagers, they tell you that a decade or so ago, the glacier just disappeared and left a 500 foot deep, half mile wide trench that extends for miles up the mountain valley. A few of these features are beginning to experience bio-colonization. Mosses and lichens are moving in and there are small patches of grass in the oldest and most stable sections of the ex-glacier. These areas will provide fascinating biogeographical laboratories for studies in dispersal and colonization over the next few decades as they slowly stabilize.

Plants of all types are thriving in the next environment. When I read accounts of mountaineering exploits from the 1930’s and their discussions of the constant snow, or of chopping a tent platform in the ice at Mt. Everest basecamp in October, and I visit the basecamp in the same month and find only rock and pools of water with an air temperature of 65 degrees Fahrenheit, I understand why the plants are doing so well and moving into so many new areas. Grasses into lichen areas, shrubs into grasslands, and lichens into any area not still covered with ice.

The problem for climate change research is that as fast as plants are moving and as beneficial as growing conditions are becoming, sheep, goats, and yaks are already there waiting for them and they are voracious. And humans are cutting wood and extracting various medicinal plants as fast as they can be found.

I worked in Nepal for a year on a Fulbright Senior Fellowship. As part of this fellowship, I researched climate change in the Himalayas and worked with graduate students at Tribhuvan University (TU). Because human extraction of biomass is pervasive—I have personally seen yaks grazing and people digging out juniper roots for firewood at elevations—*higher than the summit of Denali/Mt McKinley!*—it is nearly impossible to discern climate impacts in the face of such overwhelming anthropogenic disturbance.

A common approach to mountain climate change study is through the protocol of GLORIA sites. While this approach has had demonstrated success, researchers are critically dependant on site

selection. There can be some real problems in given locations, but when the number of samples is low, it is critical that each observation be of the highest quality. For example, while I have been here in Nepal, a GLORIA site has been established. The site was in Langtang National Park, where I had just completed fieldwork with 30 students from the Central Department of Botany (CDB) at TU. I thought it particular that they would locate the site where they did, because even a cursory glance at the literature reveals that this area suffers from massive yak overgrazing, due to the location of a cheese factory nearby (Fox et al., 1996; Watanabe, 1994; Yonzon and Hunter, 1991). While the GLORIA team had noted the cheese factory, they had attributed no significance to it and when I asked them how they were assessing grazing impacts, they said they didn't know how and were ignoring it.

Far more importantly, this area is the path of one of the most holy Hindu pilgrimages in the world and tens of thousands of people trek through this site every August. Talking with local people for even a few minutes reveals this fact. These people are coming from the lowlands and use the trek as an opportunity to harvest medicinal and other mountain plants such that nearly all of the species are removed. So why would a GLORIA site be located in one of the most heavily impacted areas anywhere in the Himalayas? Because the TU personnel suggested it and the researchers who put in the site had flown in just for a week and had no time to personally choose a site. TU takes all foreign scientists to Langtang NP because it is close and thus access is easy, but more importantly, they can bypass the cumbersome process of getting a research permit in this area and the foreign groups never know that they are acting without permission. Having spent many days in government offices trying to get 'official' permission, I understand why TU tries to avoid it if no one is the wiser.

Given the potential problems with a small number of potentially compromised intensive sample sites and given a year of research time, I have adopted a different, extensive, sampling approach. Working with my wife and several TU students per park, I am visiting all of the Himalayan protected areas in Nepal and spending 3-4 weeks in each gathering training samples for remote sensing—characterizing vegetation structure, current species altitude growth limits, spe-

cies composition, and disturbance levels. Our goal is to gather at least five hundred 20x20 meter sites per protected area. I am demonstrating to the students how to gather this data and then how to use the satellite imagery to create land cover maps measure change through time.

The Central Department of Botany at TU has been gathering botanical data for decades in these areas but the information sits unused in many bound theses in their library. By using past botanical transects collected by CDB with satellite images from the 1970s, 1980s, and more recent decades, we are looking at how vegetation has changed through time in the face of climatic and anthropogenic perturbation. By working with Nepali students who can conduct interviews on ethno-botanical harvesting, grazing, or other extractive uses, we are trying to separate the human from the climate signal. Each student works on a different aspect of a different protected area and we expect at least two PhDs and six Masters to result from this work. More importantly, I am designing this work in such a way that the sites can be accessed through time to directly measure vegetation changes in the future at given intervals.

I hope that such a widespread yet dense series of samples will yield long term benefits for research in this complex area and that researchers interested in this area will consider collaborations to maximize synergies on Himalayan climate change research.

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(Ed. Note: Previously published in the newsletter of the Tribhuvan University, Nepal.)

John All in the Himalayas



Summer Field Geology Course

Senior undergraduate geology majors again participated in a geology field course this past summer, along with students and faculty from Illinois State, Northern Illinois, North Carolina, George Mason, SUNY-Stonybrook, Bloomberg (PA), and Tarleton State universities, and St. Norberts College.

Students Yik Yu (better known as Sam) Au, Rachel Bowles, Stuart Kenderes, Ryan Hart, and Austin Moyers studied the geology of South Dakota, Montana, and Wyoming for six weeks from May 16 through June 26. The top honors for the WKU bunch went to Stuart Kenderes and Austin Moyers as WKU was, once again, well represented.

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 compose detailed rock descriptions, measure and construct stratigraphic sections, and write reports and abstracts of their work. Projects include mapping exercises in the Bighorn Mountains, Badlands, Black Hills, White-wood 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 pleasant, which is to say that there was snow in June and hailstorms at night, but sun and great skies during the day. The course was

challenging as usual, but all agreed that it was an exceptional, fun, and intense experience. These newest field geologists are ready for their careers, armed with amazing but true field camp stories!

The Department has sent thirty-two geology students to various field-based geology opportunities over the past seven 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. We surely appreciate the financial support of alumni that allows for such important experiences. You may send your donations to the Department's Gildersleeve account. Thank you!!



Photo: WKU geology folks at the Whitewood Peak field area (from left): Yik Yu (Sam) Au, Dr Andrew Wulff, Rachel Bowles, Stuart Kenderes, Ryan Hart, Austin Moyers)

Semester At Sea Enrichment Voyages "Waters of the Caribbean"

On May 26, 2010, four faculty (Dr Andrew Wulff, Dr Jason Polk, Leslie North, and Dr. Bernie Strenicky) and 11 students loaded their gear onto the *MV Explorer* in Nassau, Bahamas, launching the first Enrichment Voyage for WKU through the Semester at Sea program. The course focused on "Waters of the

Caribbean" and participants included graduate students Sarah Arpin and Lee Anne Bledsoe, geology majors Jordan Cottingham, Courtney Elder, Amy Matheny, Jared Midgett, Shelby Rader, Heather Williams, along with Tessa Duvall, Caroline Wells, and Brittane Morgan Hunt majoring in other programs.

This course, which represented a collaborative effort between the Semester at Sea Program (SAS), the WKU Honors College, and the Department of Geography and Geology, offered students the opportunity to engage in an international field-based science course throughout the Caribbean Sea aboard the state-of-the-art *MV Explorer*. Students (and faculty) participated in field activities on ten different Caribbean islands with an emphasis on the integration of geologic, geographic, and environmental issues related to water resources, climate change, and environmental policy. Students explored the natural environment, while simultaneously immersing in the local culture and developing an appreciation of the challenges of island life, as well as an understanding of the diversity of Caribbean region communities. Activities included climbing volcanoes (on St. Kitts and Dominica), exploring caves (Puerto Rico, Barbados), swimming the narrow Ti Tou Gorge (Dominica), snorkeling (Bonaire, Curacao, Aruba), visiting desalination plants, water barges, interviewing ships officers about the water operations onboard the *MV Explorer*, and.... so much more!

The field-based science activities (water and rock sampling, cave inventories, mapping, and basic geological investigations) were augmented with classroom/lab based activities, and lectures provided by WKU faculty and guest lecturers aboard the *MV Explorer*. Students also benefited from new relationships with the more than 400 other "life-long learners" and students on board the vessel, as they were immersed in the rich (and varied) cultures of the Caribbean.

Students were asked to complete pre- and post-trip surveys of attitudes and knowledge concerning various aspects of the course, including: basic geology, basic geography, behavior of water (groundwater, surface water), karst systems, volcanology, history, and cultural aspects. In addition, each student became the local expert for an island and made presentations on aspects of "their" island. Students provided anecdotal measures of success by writing a summary of the trip, using notes from their daily journal/ "ship's log" and

the WKU group made a presentation to the entire ship's company on the return to Florida.

This course offers a financially competitive opportunity for students to participate in an international experience, while receiving hands-on training in field-based science. The next voyage will be in a couple of years with an itinerary based on a trip south along the Mexico coast, Costa Rica, Guatemala, Nicaragua, Belize, and through the Panama Canal. Because these voyages are also for "lifelong learners" – you could join the WKU gang for the next WKU voyage!

If you have any questions, please contact Dr Jason Polk (jason.polk@wku.edu) or Dr Andrew Wulff (andrew.wulff@wku.edu)—or 270-745-4555.



Alumna Victoria Alapo (right) with Dr. Jane Goodall

DEFYING THE LAWS OF GRAVITY AND OTHER ODDITIES IN MARITIME CANADA

by
Michael Trapasso

The Maritime Provinces (a.k.a. Atlantic Provinces) of Canada - namely, New Brunswick, Nova Scotia, and Prince Edward Island - have held my interest for many years. Visions of beautiful coastal landscapes complete with quaint fishing villages and scores of lighthouses seemed to beckon me. Not to mention that an opportunity to escape the

near 100⁰ F temperatures in Kentucky to enter the mid-70s of this maritime climate proved irresistible. Sometimes it's good to go north! All of these gems awaited me, and the experience was refreshing and rejuvenating.

There were some interesting historical features as well. Alexander Graham Bell* had a summer home in Nova Scotia. There, one can see his genius extended way beyond the invention of the telephone. In coastal New Brunswick, I explored a fort built by the British during the War of 1812 and used during WWII as a Canadian observation post looking for Nazi U-boats cruising the Bay of Fundy. Then there were the French villages of the Acadian region. The Acadians were expelled after the French were defeated by the British in the French and Indian War (1754-1763). These French 'trouble-makers for the British Crown' departed for another French cultural presence, around New Orleans. This "Acadian" migration slowly morphed into the "Cajun" culture we know today.

There were many sites offering both fascination and natural beauty. There were also some bizarre phenomena there as well. They amused me and I'd like to share them with you.

Magnetic Hill outside the city of Moncton, New Brunswick, still has me shaking my head in disbelief. This strange place is famous for an optical illusion you would swear is true. For a fee, you can drive downhill to a white post by the side of the road. You then shift into neutral, take your foot off the brake and your car starts rolling backwards uphill! I couldn't believe it was happening! The uphill rolling accelerates to a point where you must carefully steer backwards ... there's a ditch to the side of the road. For a second I thought, "Hey Sir Isaac Newton ... what's with this?" I had to do it twice because it was so unbelievable.

In reality, this is an example of something called a "gravity hill," an optical illusion created by rising and descending terrain. The general area is at the base of a ridge named "Lutes Mountain," which rises several hundred feet above the surrounding Peticodiac River valley. Since the true geography was not apparent to me I decided to investigate more closely. The folks there let me walk the hill, and my leg muscles supplied the first bit of evidence. As WKU "Hilltoppers," we all know the

sensation of walking uphill and down on our leg muscles. My legs were telling me I was walking upslope while visibly walking down slope and vice versa. Since nothing beats hard numerical data, I pulled my Garmin hand-held GPS monitor from my field equipment bag and took readings. Down by the white post at the bottom of the hill, I was standing 95 meters (312 ft) above sea level. And the top of the hill I was standing 88 meters (290 ft) a.s.l. I drew a sigh of relief. The Laws of Gravity still exist and all is right with the world.

If Magnetic hill wasn't enough there were also the **Reversing Falls** of St. John, New Brunswick. Under the pull of gravity water flows downstream ... we all know that. But sometimes a waterfall can flow upstream. Such is the case with the lower St. John River. The river and its accompanying waterfall (actually they are more like a stretch of tumbling white water rapids) flow both ways. As the lower St. John River enters the Bay of Fundy, the Falls reverse themselves and they do it twice a day.

The tidal fluctuations in the Bay of Fundy are the highest in the world, almost 8.84 meters (29 ft). It all has to do with underwater geography. The Bay of Fundy acts like the wide part of a funnel, and the St. John River acts like the mouth of the funnel. As the tide rises, the water is forced through the 'bottle neck' created by the River's tight width and shallow bottom. At high tide the incoming water is 4.4 meters (14½ ft) above river level and the falls tumble upstream. Twice a day there is a period of equilibrium, a "slack tide" that lasts for about 20 minutes then the water begins to flow the opposite way. Even the Native Canadian tribes knew they had a scheduled 20-minute canoe crossing twice a day - any other time would be dangerous. At low tide the Bay of Fundy is about 4.4 meters (14½ ft) below river level, and the falls cascade downstream, and all is right with the world. Two-days in St. John allowed me to witness the falls flowing back and forth, several times. Having been born and raised in Niagara Falls, New York, I know a proper waterfall when I see one; this one was an odd treat.

We were quite fortunate with the weather while on our trip. The temperatures were delightful and variable cloudiness kept the sun from baking us as we explored on foot. But our luck came to an abrupt end in Charlottetown, Prince Edward Island. There

was a seriously rainy day. Rain showers ranged from occasional lulls to incredible downpours. There was no hint of lightning and corresponding thunder, but it rained buckets. As luck would have it, it rained heaviest when road traffic was most congested. I never expected such **urban flooding** to grip Charlottetown. During Friday's rush hour, the downtown streets turned into canals. I was afraid some of these huge ponds would swamp our rental car engine and leave us stranded in an incredible traffic jam. My friend Carolyn said she hadn't seen this much rainfall since the devastating Nashville Flood of early May. I wish she hadn't said that! I was involved in some real white-knuckle driving.

The good news ... we had seen about as much of P.E.I. as we cared to and were heading out of the City toward the Confederation Bridge, a 13 km (8 mi) span connecting P.E.I. to New Brunswick. The bad news ... we were downtown in the lowest elevation, just off the Northumberland Strait, crawling and praying our way upslope and outward. I was never so happy to leave a city behind as I was Charlottetown on that day. The rain followed us across the Confederation Bridge, parts of which disappeared into fog and low-level cloudiness. The next day the CBC (Canadian Broadcasting Corporation) carried the news of the Charlottetown flood nationwide. Some intensity estimates called for over 63.5 mm (2.5") of rain in less than 1½ hours. It was a good thing we left when we did, or we might have been trapped in that developing urban lake.

Back in New Brunswick with sunny skies the next day made the whole episode seem like a fading nightmare. But, in general, the trip to the Maritime Provinces was more like a pleasant dream, complete with idyllic landscapes, engaging history, and at times, stuff that was just plain weird.

* Alexander Graham Bell never kept a telephone in his office; he found them to be too distracting. He thought they should be used for emergencies only, and much preferred outgoing to incoming calls ... with respect to cell phones, my sentiments exactly.

Magnetic Hill is mentioned in the Raffi song "C-A-N-A-D-A," from his *Bananaphone* album.



Magnetic Hill, Moncton, New Brunswick. Though the road appears to be going downhill, in reality you are looking upslope



The Cape Bear Lighthouse, Prince Edward Island. The first distress signal from the sinking "Titanic" was received here on 14 April 1912



Reversing Falls, St. John, New Brunswick. Though difficult to tell from a single photo, these falls are flowing upstream.

FACULTY ACTIVITIES

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KATIE ALGEO spends a lot of time mentoring graduate students and was pleased to see Matthew Brunt and Shwu-jing Jeng finish their theses during the 2009-2010 academic year, and Ann Epperson and Elizabeth Robb get very close to completion. These students' success is even more impressive when you consider that all four are gainfully employed full-time in their field! All four use GIS, in areas as diverse as transportation, environmental planning, broadband internet services, and GIS software development. Katie concentrated her teaching this year on GIS and is looking forward to developing a new class in Historical GIS for Spring 2011.

Much of Katie's research continues to involve the historical geography of the Mammoth Cave area. Recent papers explored the social geography of saltpeter (produced at Mammoth Cave during the early 19th century), tourism by African Americans to Mammoth Cave during the Jim Crow era of racial segregation, and the use of visual media to promote show caves. In February, she was invited to Kansas State University to present a research seminar "Mammoth Dreams: Construing and Constructing Place at the World's Longest Cave." She also collaborated with colleagues at other universities on a paper, currently under review, on teaching nationalism.

JOHN ALL apologizes for telling a lie in the last GEOGRAM. While he said he wouldn't climb Mt. Everest, it was just too pretty of a mountain. When some fortuitous circumstances allowed him to climb for a fraction of the normal price, he couldn't say no. John reached the summit of Everest on May 23rd via the North Col/Northeast Ridge through Tibet.

John spent most of last year teaching in Kathmandu and gathering data across the Himalayas. Dr All was awarded a Senior Fulbright Fellowship to study Climate Change and Resource Management in the Himalayas and worked at Tribhuvan University (TU) – the national university of Nepal – teaching

remote sensing. The intermittent nature of electricity in Kathmandu (only a few hours of power a day) and water (no hot showers for months and no water often times even for drinking) along with roads and highways being closed by civil unrest for days at a time made for a difficult experience. He and his wife, Narcisa, spend a lot of time in the mountains collecting data and teaching TU graduate students how to collect field data. Since they had a GPS at all times, they knew how far they walked and how high they climbed: by the time he left, John had hiked over 750 miles and climbed more than 50 vertical miles in elevation! Hiking up the Hill to EST everyday doesn't seem as taxing as it once did... Dr All also developed a Remote Sensing/GIS lab for the Institute of Science and Technology within TU after writing and receiving several grants. He was able to write several manuscripts – two of which were published, one is in press, and two are being finalized. Narcisa used the semester to finish her dissertation using data gathered in Africa prior to the Nepal trip, and helped teach GIS at Tribhuvan. Overall it was an incredible experience, but it is wonderful to be back in the U.S. and have a thick, juicy hamburger and fries! John hopes his students will learn a lot from his experiences and that they will be able to use his data for a variety of research projects.

KEVIN CARY notes that it has been an exciting year. He received the *Exemplary System Award for GIScience at WKU* for the Department at the 2009 Kentucky GIS Conference hosted by the Kentucky Association of Mapping Professionals (<http://kampro.org>) in Frankfort, KY. This award recognizes all of the Department's efforts in the GIS program. The Department offers a bachelor's degree in GIScience, minor in GIS, certificate in GIS, and a graduate certificate in GIScience (<http://www.wku.edu/gis/>). Senator Julian Carroll (and former Governor of Kentucky) was in attendance.

Kevin continues to be a reviewer for GISCI (<http://www.gisci.org/>). In March, he renewed his professional certification in GIS (GISP), as it must be renewed every five years. As of summer 2010, there are over 4,600 GISPs worldwide.

This past academic year marks the highest number of students from WKU winning assistantships for

ESRI's International User Conference in San Diego. A total of four students (from the Department), out of 60 awarded in the U.S., were selected to attend the 2010 July conference with a paid assistantship. Participants are required to work half days at the conference, with registration, food, drinks, and lodging included in the stipend. Airfare was generously provided by the Department for all four recipients. Since 2003, two students from the Department each year have been selected for this opportunity.

Kevin keeps busy teaching GIS courses and managing the GIS labs. The labs comprise a student teaching lab and 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, Dept. of Planning, Design, and Construction, WKU Telecommunications, Dept. of Parking and Transportation Services, Logan Co. Economic Development, Geoscire (<http://www.wku.edu/geoscire>), and the Blueways of Warren Co. (<http://www.wku.edu/blueways>). The GIS Center recently acquired two new Trimble GPS units for teaching and services, as well as several replacement computers. The GIS Center also has four servers to support research and instruction. Two of these servers are for teaching upper-level GIS courses (or thesis projects) with ArcSDE, ArcGIS Server, and MS SQL, software traditionally outside the standard desktop application.

MARGARET CROWDER sends greetings and salutations! She continues to live the life of a double agent. By day, a mild-mannered instructor in the Department of Geography and Geology, at night and on weekends, she transforms into a paper-writing, class-taking graduate student capable of calling forth the powers of science education research and educational leadership strategy as a cohort member of WKU's Doctoral Program in Educational Leadership. Margaret is currently working to discover the proper attire and weaponry for battle with the ever-present dissertation demon and, over the coming year, plans



to work with her dedicated team of experts (i.e., dissertation committee) to research the strengths and weaknesses of her foe so that she may fight her way to victory (i.e., a doctorate) in 2012.

While battling the forces of 'graduate school,' Margaret continues to teach introductory Geology and Geography courses in the Department and actively encourages more students to be involved in one of the Geoscience majors. Her research focus is on issues associated with Geoscience education and gender, and she works in the areas of STEM education through involvement with SKyTeach and as an instructor in outreach programs such as Girls in Science Day and SCATS. During SCATS this past summer, Margaret supervised two SKyTeach students, Crystal Smith and Jordan Taylor, in teaching internships for the two-week summer program.

Margaret also advises several Geology undergraduates and has supervised one of her students, Stuart Kenderes, as a teaching assistant for GEOL 102/GEOG 100 and through an independent research project developed from a literature review of post-secondary education strategies for geoscience education. Stuart presented his work in Fall 2009 at the KAS annual meeting and took first place in the Undergraduate Research Competition in the Science Education section for his talk, "Examination of Geoscience Education Practices."

This past year, Margaret collaborated with several other WKU faculty to submit an NSF grant proposal for a multi-disciplinary project focused on helping faculty implement effective teaching approaches to introductory courses and enhance math/science teacher preparation. She is hopeful that the project will be funded within the coming year.

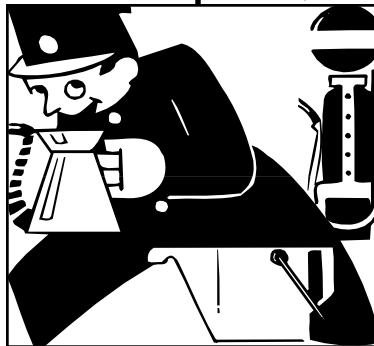
Once again, life is surely good (and getting busier and better all the time!) in Margaret's world.

JOSH DURKEE in his second year at WKU taught two new honors sections of GEOG 100 and 121, as well as two other new courses in Mesoscale and Physical Meteorology (GEOG 437 and 438, respectively). His students in GEOG 437 competed

in the national forecasting competition, WxChallenge, which hosts over 2,000 forecasters that range in skill up to the professional level. Josh also developed a new field-based course, "Field Methods in Weather Analysis & Forecasting," with eight students traveling across the Great Plains during the first summer term, forecasting and analyzing severe storms. The inaugural class took place in May 2010 and was quite a success. After traveling just over 8,000 miles across 14 states, while consuming nearly 160 Subway sandwiches, the class was able to forecast successfully a multitude of severe storms, with the students witnessing at least 17 tornado touchdowns. Needless to say, he is already gearing up with excitement and anticipation for the 2011 storm chase. Additionally, Josh was actively involved in various activities including the Meteorology Club, WKU Storm Spotter Network, the Science Olympiad, and a severe weather workshop at the Cumberland Trace Elementary School here in Bowling Green.

In terms of research activity, Josh was invited to submit two articles for the Climatology section of *Geography Compass*. The first article is a review on the various methodological approaches for measuring global precipitation, and the technological advances the future holds for such measures. This article was published in August 2010. The second article is a review of the literature and current understanding of high-wind events that occur outside of thunderstorm environments. This article is currently in press at the time of this writing. Josh has also submitted an article to the *Journal of Geoscience Education* that describes new approaches toward teaching severe weather exercises for college-level introductory courses in weather and climate. This article has been accepted pending minor revisions at the time of this writing.

Aside from his own research endeavors, Josh collaborated with a number of undergraduate and Gatton Academy students that resulted in five professional conference presentations at the national, regional, and local levels. Further, Josh is collaborating with other faculty within Ogden



College on a National Science Foundation-funded effort that involves undergraduate researchers from around the country studying various aspects of the Green River Watershed in KY. With the first year of the REU program completed, two of his researchers are slated to attend two regional and national conferences to present findings from their research on thunderstorm activity over the basin. Following these conferences, Josh wishes to submit the work for peer review.

For the 2010-2011 academic year, Josh plans to wrap up two research projects pertaining to climatological variations in South American thunderstorm activity and a case study of a non-convective high-wind event over the Great Lakes region, and submit them for peer review. After returning from the American Geophysical Union Meeting of the Americas in Foz Do Iguaçu, Paraná, Brazil, where Josh made two presentations, he also plans to continue to move forward on South American thunderstorm research. Josh will also be teaching a revised course on Synoptic Meteorology (GEOG 432) this fall and plans to continue to work actively with undergraduate, graduate, and Gatton Academy students on various research endeavors.

XINGANG FAN has successfully transitioned from a research Assistant Professor into a tenure-track Assistant Professor during the past year. He taught GEOG 121 Meteorology and GEOG 422/522 Physical Climatology courses. In addition to these courses, Dr Fan is working with Dr Jun Yan on development of a Study Abroad Program focusing on China for summer 2011. He went on an exploration trip to China, together with Dr Yan, to investigate and design the best route for the program. The goal for this new study abroad program is to provide student opportunities to experience the geographical and geological wonders of China, as well as to learn about the climate and environment of the country. Another course Dr Fan is developing based on his background, interest, and expertise is an Atmospheric Modeling course, to be first offered in

Spring 2011. Nowadays, weather forecast and climate prediction heavily rely on numerical modeling outputs. Numerical modeling is now a basic and powerful tool in weather and climate studies. This course aims to enhance our new B.S. Meteorology program, acquaint students with this useful skill, and prepare them for the workforce and for professional research. With his research project started last Fall, Dr Fan has worked on climate downscaling. In the meantime, Dr Fan has put effort into expanding the collaborative relationship with WKU colleagues and outsiders. He is continuing to establish collaborative work with Dr Mahmood on soil temperature and soil moisture and is working on a new grant proposal. He also started collaborative discussions with scientists in China. As a result, a visiting scholar from China, Liang Chen, has come to WKU to work with Dr Fan, supported by a NASA grant. They hope to establish a long-term collaboration and to work on mutually interesting areas, especially soil and the climate.

LEE FLOREA spent this past year developing new course preparations in hydrogeology, oceanography, and geophysics, and engaging in research in Kentucky, elsewhere in the U.S., and in the Bahamas. Also this past year, Dr Florea served as the Executive Vice President of the National Speleological Society, became a Registered Professional Geologist in the Commonwealth, and attended the Wakonse Conference for College Teachers in Michigan. His publications this past year have included several student research abstracts and a peer-review article in the ISI-ranked journal *Isotopes in Environment and Health Studies*.

In May, Dr Florea advised one graduate student to the completion of an MS in Geoscience, *Scot Russell*. Scot's MS thesis explored the use of a geophysical technique called electrical resistivity to map hydrologic and geologic features in the subsurface at an abandoned well field on the north end of San Salvador, a small island in the eastern portion of the Bahamian Archipelago. Scot's research was permitted by the Bahamian Government and supported by a combination of

resources and funds from the Gerace Research Center (College of the Bahamas), Hoffman Environmental Research Institute, the Cave Research Foundation, and the Department of Geography and Geology.

More recently, Dr Florea has taken graduate advisement responsibility for Nicholas Lawhon. Along with geology senior Chasity Stinson, Nick has undertaken a year-long study of the physical and chemical hydrology in Redmond Creek, a massive sinkhole in Wayne County, Kentucky, and the source of waters for Otter Creek, a tributary of the Cumberland River. More than 43 known caves in this sinkhole convey waters from the surface through the ground to emerge at Sandy Spring, a historic source of drinking water for residents in the vicinity of Slickford. Collectively, the data they will gather from Redmond Creek will reveal seasonal cycles and links between climate patterns and groundwater chemistry in the karst of southeast Kentucky.

Currently Dr Florea is funded by Provost Incentive Funds to assess the interaction between shallow reservoirs of petroleum that are sulfide-rich and groundwater in Wayne County. These funds have engaged students in water sampling, geochemical analysis, and travel to the stable isotope laboratory in the Department of Geology at the University of South Florida. The goal of this research is to quantify the influence that petroleum may have, if any, upon the development of pore spaces in the subsurface, and therefore the migration of oil in this petroleum reservoir that was a major national production reservoir in the early to mid 20th Century.

Over the next year, Dr Florea will develop materials for courses in water resources, environmental science, and a possible Study Away program in south Florida. He presently is working on several manuscripts and a book contract with Mountain Press. Finally, Lee hopes to dedicate some effort to projects at the family farm and spend time with his wife.



STUART FOSTER completed his 22nd year in the Department. This past year, he taught the Geography of Kentucky course for the first time. Having traveled the state, including numerous back roads, and having met with local officials in communities throughout the Commonwealth, Dr Foster felt compelled to share some of his experience with students. “The Kentucky Mesonet project has provided me with a wonderful opportunity to experience Kentucky,” he commented. “It is a exciting challenge to cultivate an appreciation of place and to convey the complexity of Kentucky’s evolving geography to students who typically have a very limited exposure to the Commonwealth.”

Dr Foster continued in his role as state climatologist. He co-chairs the Climate and Water Resources Data Team created through the new Kentucky Drought Mitigation and Response Plan. The team convened this summer as drought conditions developed in western Kentucky. While portions of Kentucky were dry, the 2010 summer was extremely humid. Numerous records were broken for the number of days with low temperatures remaining at 70 degrees or warmer. With the unusual weather it was a busy year for media interviews. Finally, the Kentucky Climate Center added a new look and feel to its website (kyclim.wku.edu) this summer.

Growing visibility of the Kentucky Climate Center and Kentucky Mesonet led to numerous speaking engagements. Dr Foster was an invited speaker at several conferences and events over the past year. A highlight was a talk on climate change in Kentucky at the Regional Climate Change Forum hosted by the Kentucky Science and Technology Corporation in Lexington. He participated in a panel discussion on managing a state mesonet at the Annual Meeting of the American Association of State Climatologists in South Lake Tahoe, California. Dr. Foster also gave a presentation on climate-related natural hazards at the 2010 Kentucky Weather Conference organized by the Kentucky Division of Emergency

Management and the Kentucky Climate Center and held in Bowling Green. He provided an overview and update on the Kentucky Mesonet at the 2010 Annual Kentucky Association of Mitigation Managers Conference at Lake Barkley. Finally, Drs Foster and Mahmood presented an update and overview on the Kentucky Mesonet to the board of directors of the Center for Renewable Energy Research and Environmental Stewardship in Louisville and gave a similar presentation as part of the Kentucky Renewable Energy Consortium’s Wind Energy in Kentucky Webinar.

While geographers inherently enjoy traveling, Dr Foster spent several summer evenings sitting in the stands at the ballpark watching Bowling Green’s minor league baseball team, the Hot Rods.

“I can’t think of a better way to enjoy a summer evening,” he said, “but it would be nice if they would occasionally win a ballgame.”



GREG GOODRICH writes

that the 2009-10 academic year brought a lot of changes to the Goodrich household. Miles and Camden were born October 19, 2009 and have kept Dr. Goodrich very busy since that time. The new arrivals limited Dr. Goodrich’s research time during the academic year, but he was able to get six articles submitted during the summer of 2010 to make up for lost time. The research projects covered a wide range of topics, ranging from drought trends in the Southwestern United States to variations of local spatial autocorrelation of global tropospheric temperatures to changes in precipitation intensity in the United States. Another recent project is an analysis of the historic flooding that occurred in the Mid-South during Derby weekend in May 2010.

In the classroom Dr Goodrich had two new preps for 2009-10. Dynamic Meteorology I introduces the use of vector calculus in meteorology and develops several coordinate systems for understanding atmospheric forces (Cartesian, rotating, spherical, natural) that are both inertial and apparent. The understanding of atmospheric forces leads to the creation of conservation laws that

govern atmospheric motion. The course concludes with a discussion of dry thermodynamics. Dynamic Meteorology II uses the conservation laws developed in the first course to create an understanding of various applications of the fundamental equations that approximate most atmospheric flows. The course also includes several weeks of moist thermodynamics. These courses represent the theoretical capstone to the meteorology curriculum and are, without question, the most challenging meteorology courses taught at WKU. In essence, the two-course sequence provides students with a thorough understanding of the primitive equations that are used in computer models to predict and understand the weather. Dr Goodrich also taught GEOS 500 (Geoscience Research and Literacy), GEOG 175 (University Experience), and GEOG 424 (Weather Forecasting and Analysis).

The Meteorology Program continues to grow and prosper under the guidance of Dr Goodrich. The first cohort of graduates in the new B.S. degree in Meteorology found great success in the job market in Spring 2010. Two graduates were hired by the National Weather Service (Danny Gant – Memphis, TN, and Jane Marie Wix – Marquette, MI) and another was hired by a private weather firm (T.J. Malone – Meridian Environmental Technology). Two other graduates received assistantships to continue their education in graduate school (Tony Bedel – University of Georgia, and Astrid Gonzalez – Penn State University). Four other current students in the Meteorology Program received SCEP internships with the National Weather Service that guarantee the students (Brittney Whitehead, Sam Roberts, Andrew McKaughan, and Ian Blaylock) a job with the National Weather Service upon graduation. In addition, rising junior Kyle Mattingly received a highly competitive NOAA Hollings Scholarship.

Finally, Dr. Goodrich is happy to report that the WKU Meteorology Blog (<http://meteorology.blog.wku.edu/>) is now entirely student run. Several upper-division students in the Meteorology Program as well as Geoscience graduate student Mitchell Gaines provide discussions of Kentucky weather and climate several times a week, especially during times of severe weather. The blog

contains information about the B.S. degree in Meteorology program as well as dozens of links to weather and climate websites.

MARGARET “PEGGY” GRIPSHOVER

enjoyed the challenges and opportunities available during her first year as a member of the faculty. She feels right at home in Bowling Green, and has learned all the important things that locals know---avoiding Scottsville Road on a Saturday night and how to get to Chaney’s Dairy Barn! She taught a variety of classes, including World Regional Geography, Geography of the South, and Economic Geography. Dr. G., (as she is known to her students!) will have three new classes to teach in the coming year—Cultural Geography, Geography of Kentucky, and Honors in World Regional Geography. She has also been advising a number of Master’s students and has

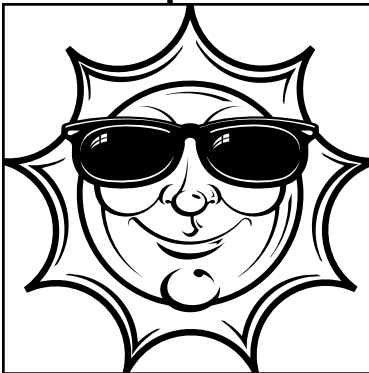


worked with Honors students on special research projects. When she is not in the classroom, Peggy has been busy with her research and a new responsibility, serving as Co-Editor of the international journal, *FOCUS on Geography*. She continues to make progress on her book project titled, *Lucky Charlie Weeghman: The Man Who Built Wrigley Field*. As part of her Weeghman research, she presented a paper in April on the effects of weather on the Federal League’s 1914 spring training season, at the Society of American Baseball Research’s (SABR), “Boiling Out Conference,” in Hot Springs, Arkansas. Peggy is a member of SABR’s “Deadball Committee” and the SABR chapter in Nashville, TN. Another project related to her book was a paper on the influence of environmental perception on the annexation of Lake View into the city of Chicago, presented at the Association of American Geographers (AAG) meeting in Washington, DC. Lake View is the Chicago neighborhood in which Wrigley Field is located. The Lake View paper was coauthored by Peggy’s movie-star-handsome spousal unit, and indefatigable adjunct faculty member, Dr. Thomas L. Bell, who is also her Co-Editor for *FOCUS*. Tom was also the co-author on a paper they presented on the early history of the AAG, presented at the Southeastern Division of the Association of

American Geographers (SEDAAG) conference in Knoxville, TN. Peggy remains active in both the AAG and SEDAAG, serving on a number of committees, including the World Geography Bowl committee for both organizations. In addition to her baseball research, Dr. G. continues to work on her equine research projects, including journal articles on Tennessee Walking Horses and horse racing. Now that she lives in Kentucky, the horse capital of the world, she should really be inspired to gallop forward with her work! When she is not digging deep into archival resources for her research or pontificating in front of her classes, Peggy enjoys playing tennis, gardening, cooking, painting, her dog Sophie, and traveling the back roads without a GPS.

CHRIS GROVES continued to have toes in both the eastern and western hemispheres this year directing the programs of the Hoffman Environmental Research Institute and its China Environmental Health Project (CEHP). Since last year's *Geogram*, Groves made three brief trips to China with various teams from WKU and Mammoth Cave National Park making great progress in CEHP's programs. A CEHP team including nine students, faculty, and staff from the Park and Hoffman Institute worked with Chinese colleagues in August 2009 to conduct a workshop in Kunming, Yunnan *Principles and Methods of Karst Resource Management*. They trained over 100 students and government hydrologists from four Chinese provinces in methods of karst water resource development. The group then headed south to the beautiful Stone Forest where Mammoth Cave Superintendent Pat Reed signed a cooperative agreement with officials from UNESCO's South China Karst World Heritage Site.

In December, Groves and Fred Siewers travelled to UNESCO's International Research Center on Karst (IRCK) in Guilin as invited faculty for the *International Training Course on Karst Hydrogeology and Ecosystems*, where they lectured to a diverse group of students from a variety of countries including Vietnam, India, Uganda and Indonesia. While there, Chris also attended the annual meetings of IRCK's Board of Governors and its Academic



Committee, on both of which he serves.

Groves joined Rick Toomey and Elizabeth Winkler on a July trip through several provinces of southwest China making plans for WKU courses in the hydrogeology and resource management of this spectacular karst region. Among the highlights were the beautiful and remote cone karst of Libo and Maowan, Guizhou, and several spots in Wulong, Chongqing. There, at San Qiao a series of four enormous, vertical walled sinkholes, in places more than 1,000 feet deep, are connected by natural bridges more than 400 feet tall.

Closer to home, things chugged right along in the Hoffman Institute. Sadly, Crawford Laboratory Manager Pricilla Baker moved with her husband Ted (now gainfully employed after completing his WKU MS degree) to California, and Pat Kambesis is now stationed at Mississippi State University, working on a PhD in Geology. She will continue her role as Hoffman Institute's Associate Director for Education, and this year we welcomed Dr Jason Polk, who will serve as the Institute's Associate Director for Science. Lee Anne Bledsoe now runs the Crawford

Hydrology Lab.

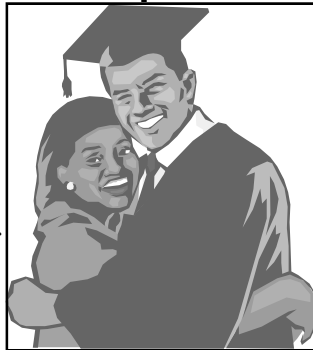
At home, this summer Chris and Deana welcomed Ms Guo Riujie from Hubei, China, who will live with them for a year while she works as one of 11 teachers currently teaching Chinese at WKU and local public schools as part of WKU's new Confucius Institute. Lillian and Leah are thrilled to have a new big sister (jiejie), and everyone is having fun learning Chinese from Riujie, each at our own rates.

PAT KAMBESIS writes that this year has been busy with teaching, travel, and lots of field work. Fall semester she taught, for the first time, an online version of Fundamentals of GIS (and did it again during spring). Online teaching is a bit more challenging than the standard classroom in terms of determining which students need more help, and she is still on the learning curve for how to teach online effectively. During summer 2010, Pat taught "Cave Survey and Cartography" during the Department's

annual Karst Field Studies program. This is an intense, week-long class that covers the basics of collecting cave survey/inventory data, with morning lectures, afternoon field work, and evening cartography. But by the end of the week, students were all producing high quality digital maps from data they collected.

This year much of Pat's field work has been in the Caribbean working on various aspects of coastal karst. In October Joel Despain (WKU 2003) and Pat, along with Mike Lace and Jim Goodbar (BLM cave specialist), spent another week in Haiti working with the Ministry of Tourism on documenting caves and karst features that have the potential for ecotourism development. The team invested most of its efforts in Grotte Marie Jeanne, Haiti's longest cave, located in Port-a-Piment on the southern coast of Haiti. On a 2008 trip, their survey was stopped when they encountered a lake at the bottom of the cave. This time, the team came prepared with inflatable rafts but the lake was nowhere to be found – indicating that the hydrology of that side of the island is more complex than thought at first. The inventory documented a distinct conglomerate horizon at consistent elevation throughout the area caves, which may prove to be an important marker bed. Biologically they noted 4-inch diameter tarantulas living throughout the cave, turquoise blue worms, and a huge bat population (estimated at 20,000 individuals). The team also found more *taino* artifacts indicating paleo-entrances that are not currently obvious on the surface. Despite the devastating earthquake that happened after the trip, their Haitian colleagues are anxious for them to return.

During Thanksgiving week, Pat co-led an expedition with Joel Despain (WKU alumnus 2003) to Mulu National Park at the invitation of the park management. Josh Brewer (WKU 2006) and Shane Fryer (WKU 1999) also participated in this trip. The primary objective was to conduct a detailed re-survey of Deer Cave to get accurate dimensions in order to compare its size to a newly discovered cave in Vietnam. Deer Cave used to lay claim to having the largest cave passage in the world but researchers working in the new cave claim it has greater dimensions. A comparison of the Deer Cave re-survey



with the new survey in Vietnam will make the final determination (the latter is still in progress). At Deer Cave, the group used a combination of traditional survey methods along with the high-tech laser series of sediment terraces, which will be important for constructing the paleo-hydrology of the Deer Cave block and for paleo-climate work. In conjunction with the field work, they also gave several presentations to the Park's interpretive staff on the how and why of their work and to provide staff with more information for their tours. A new detailed Deer Cave map and 3-D model are currently in progress.

In December Pat collaborated with colleagues from Mississippi State University and the University of Alberta on a coastal karst reconnaissance to Barbados. Though the field session lasted only a week, the team documented and mapped 43 caves- and the variety included caves of littoral, talus, flank margin and fluvial origin. They began a detailed survey of Coles Cave, which is likely related to Harrison's Cave – the longest on the island. They also began working on morphometric analysis of one of the island's many gullies- features that look like dry valleys, and whose origin is under debate. Since many of them contain caves and old speleothems, the current thought is that the gullies are simply collapsed cave passages. However, data, though preliminary, indicate that the origin of the gullies is more complicated than a simple cave collapse and may very well be related to sea-level change and tectonic uplift. Pat needs to go back! In spring 2010, Pat submitted, on behalf of the Hoffman Institute, a proposal to Harrison's Cave management to assist in developing a wild tour, guide training, and interpretive displays for the wild tour.

Pat completed two trips to Puerto Rico in 2010. In January she worked in the central section of the North Coast karst in the Rio Manati drainage basin specifically in Sistema Encantado, Puerto Rico's longest cave at 17 km. Her goal was to help connect hydrologically active and paleo segments of cave passages to the main system and to determine injection points for a series of dye traces, which are in the planning stages. In May, Pat continued working on a long-term collaboration (since 1998) with Puerto

Rico's Department of Natural Resources, on a cave inventory on Isla de Mona – a small island located 50 km west of the main island and one of Puerto Rico's most significant natural reserves. The island is uninhabited, save for a small crew of rangers who rotate out on a weekly basis. The only well on the island is brackish and the rangers do have a desalinization unit, which has a limited capacity. So visitors have to bring in their own fresh water (enough to last 10 people for 8 days) on the boat that is chartered to take visitors to the island. This season, the team added 6 km of new survey bringing its overall total to 70 km of mapped cave passage. Since 1998, Pat and the team have documented 160 caves. Their inventories also geo-reference historical guano mining operations and artifacts and *taino* pictographs and petroglyphs, which occur throughout the many caves on the island.

In February 2010, Pat spent a week volunteering at Carlsbad Caverns National Park working on remapping the commercial sections of Carlsbad Caverns for the Cave Resource Office (CRO). She worked the Kings Chamber and Queens Palace section and the Iceberg Rock area of the tourist route. Pat and her colleagues recently finished the map for the Big Room and submitted a digital copy of CRO. Digital version of the work completed in February.

As Pat wrote these comments, she was on a plane enroute to Ketchikan, Alaska, where she spent a week working with the US Forest Service on coastal karst inventory off the south coast of Alaska. Johanna Kovarik (WKU 2007) and Jim Baitchal, Forest Geologist are leading this effort and Andrea Croskrey (WKU 2006) is also part of the field crew. Pat will have to report those results in next year's GEOGRAM.

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

In a continuing theme, travel still dominates Dr Keeling's professional and personal life, and over the

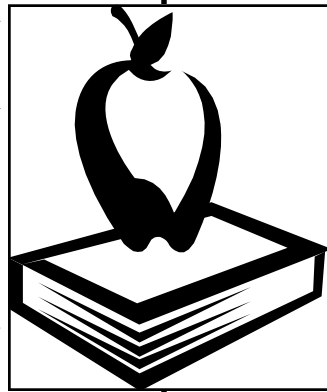
course of the academic year he enjoyed more marvelous research and lecture trips to the four corners of the planet. In late-May 2009, Dr Keeling journey back to Argentina to continue research on transportation developments and to begin work on an article addressing transportation inequities in the region. He also visited Portland, Oregon, to attend the International Partnership Institute workshop. In June, he hopped across the Atlantic to Manchester, England, to continue research on urban rail developments in that city.

In July, he again joined an AGS educational expedition, this time on the Great Lakes from Duluth to Toronto, via several fascinating port cities on the lakes. Dr Keeling gave lectures on climate change, economic development, and exploration in the region. A few weeks later, he crossed the Pacific Ocean to join Chris Groves and his team in Kunming, China, to observe a project lead by the China Environmental Health Program. After a quick trip to New York for the Fall council meeting of the American Geographical Society, Dr K. headed back across the Atlantic to London, England, for some more transportation research (and some good ale!).

In January, he joined Huda Melky on a study abroad program to Egypt with 11 students and two faculty from the Business College. With visits to Cairo, Luxor, Alexandria, and Sharm, the students learned much about Arab culture and the Islamic world. Visits to New York, Sacramento, and Washington, D.C., for meetings and conferences rounded out another hectic year of travel.

Within the community and on campus, Dr Keeling gave several talks on issues ranging from Yemen's economic and political challenges, to Namibia, Afghanistan, and the world's ancient civilizations. He interviewed for the 33rd time on WKYU-FM's MIDDAY Edition—and he appeared on the Howard Stern radio show explaining why Americans needed to be more aware of geography and the world around them. 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 attended



way too many meetings during the year, but managed to contribute to the ongoing Leadership Studies program (www.wku.edu/leadership) and to international education on campus. Despite the administrative load, Dr. Keeling still found time to write and publish research—his third and final review article on transportation research appeared in the August 2009 issue of the international journal *Progress in Human Geography*. He also completed a photo-essay titled “*Bridging Space and Time around the World*” that appeared in *FOCUS on Geography* in December 2009, and began a review series called “Annotated Websites” that appears in each issue of the *Journal of Latin American Geography*. His essay on “Transport Infrastructure for a Global Society” appeared in the Spring issue of *FOCUS on Geography*. Several Op-Ed commentaries almost appeared in national and international newspapers during the year.

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 the 2009/2010 academic year was another exciting and productive one. She spent another very industrious year teaching, researching, traveling, and planning new geographical experiences. During the past year Debbie taught the *Fundamentals of GIS, Geography of North America, World Regional Geography, the Geography of Europe, and Honors World Regional Geography*. She also continued to teach two online courses for Independent Learning at WKU: *World Regional Geography* and *Natural Resource Management*.

Along with other faculty in the Department, Debbie is also dedicated to lifelong learning, attending research conferences and meeting with experts and colleagues in the field of geography. In April she attended the annual meeting of the Association of American Geographers (AAG) in

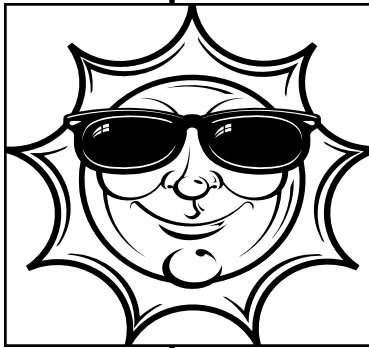
Washington, D.C. Debbie presented a paper coauthored with her colleague Dr Stuart Foster. The poster examined commuter patterns in Kentucky and the effectiveness of the Kentucky Area Development districts.

Debbie spent some of the summer in southern and central Utah visiting family and investigating the landscape. St. George, Utah, was one of the cities she visited this summer. It is located about 20 miles north of the Nevada border and about an hour and a half from Las Vegas. St. George is a little bigger than Bowling Green and, from 1990 to 2000, was the fastest growing metropolitan area in the United States. It will be interesting to examine the new census data to see if the trend continues, especially since St.

George is located at the edge of the Mojave Desert and water resources are scarce. The other city Debbie visited was Price, UT, also a desert location – but high desert compared to St. George. The latter lies at about 3000 ft. above sea level and Price is almost twice that. The temperature difference was conspicuous! It was 105 degrees in St. George and 85 degrees in Price.

Price is a small coal mining town (between 8000 and 9000 people) and many of the people that live there were involved in some way with the 2007 Crandall Canyon mine accident. Price is also a geoscientist’s heaven! Not only is it rich in coal, but it is also a dinosaur hunter’s paradise and has a very good Dinosaur museum and a few sites outside the city where one can see paleontologists at work. Price (and the surrounding area) has the nickname of “castle country” and is surrounded by beautiful canyons and other fantastic geologic features like the San Rafael Swell. Both St. George and Price are well worth exploring (especially for our life-long learner graduates)!

Debbie is still working on research with her son (a local hardware store operator in Maine), concerning the *Main Street Maine* and the *Maine Downtown Network*. This research concentrates on how small businesses in small towns contribute to economic revitalization by applying for and using state and federal grants and registry status. Debbie is also starting a research project with Dr Peggy Gripshover



examining the change in the thoroughbred horse industry in Kentucky and the surrounding areas. For more information about her interests or about study abroad, please contact Debbie at this email address <debbie.kreitzer@wku.edu>.

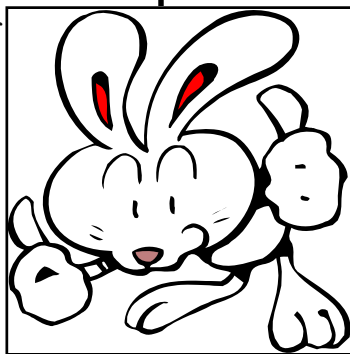
KEN KUEHN's 2009-10 academic year was a very busy one. He was co-author with Dr Mike May on a peer-reviewed article for *World Oil* magazine titled "Renewed interest in heavy oils and rock asphalt in south-central Kentucky" and on a poster on that topic presented at the 2009 annual meeting of the American Association of Petroleum Geologists (AAPG) in Denver. He also was co-author of the article, "Did the Middlesboro, Kentucky, bolide impact event influence coal rank?" that appeared in the *International Journal of Coal Geology*. Ken continued research on his current project funded by the National Park Service, "Preparing an Evaluation Report for a potential National Natural Landmark known as The Walls of Jericho, Alabama," together with a Geoscience graduate student.

Ken serves as Councilor for the Kentucky Society of Professional Geologists (KSPG) and was principal organizer for its 2009 annual field conference, which was held in northern Kentucky and Cincinnati in conjunction with the Kentucky Academy of Science annual meeting. Fifteen WKU geology majors participated in the field conference and they all enjoyed working side-by-side with professional geologists from across the Commonwealth. Ken also continues to serve as Member-at-large of the National Association of State Boards of Geology (ASBOG), a group that regulates the testing, ethics, and practice of professional geology in the United States. On campus, Ken is Co-chair of the Education for Sustainability Steering Committee, which addresses academic dimensions of sustainability initiatives at WKU. This committee brought forward a Resolution which was accepted by President Ransdell and the WKU Board of Regents in January 2010 establishing "Education for Sustainability" as a core value of the University.

During Spring 2010, Ken served in the role of Faculty Fellow with the WKU Women's Studies program, assisting it in a period of leadership

transition. This summer he accepted another new challenge as Interim Department Head of the newly created Department of Interdisciplinary Studies. He will serve in that position for the 2010-11 academic year with a reduced teaching load in the Geology program.

Ken was able to participate in significant professional development activities this past year as well, including travel to Colorado, Nevada, Washington, Oregon, Montana, Maine, New Brunswick, and Nova Scotia. He is always glad to hear from you and to get caught up on your latest *GeoNews*. So stay in touch! (kenneth.kuehn@wku.edu, 270-745-3082)



REZAUL MAHMOOD has

continued to focus on various fronts with teaching, research, and service. He enjoyed a sabbatical during Fall 2009 and, during this time, he continued to focus on projects, visiting several universities in an effort to develop collaborative relationships. As in the past, he has engaged graduate and undergraduate students in research and provided hands-on experience. Rezaul is pleased to report that a number of these students have entered prestigious graduate schools, and accepted jobs in the National Weather Service and in private sector.

Rezaul's research focus remained on modeling the impacts of land-use change on climate, impacts of soil moisture on planetary boundary layer atmosphere, land surface-atmosphere interactions, modeling of transport of gaseous emissions from livestock operations, and the hydrometeorology of flash flooding in the Appalachian region. Rezaul mentored students to present papers and posters at the 106th annual meeting of the Association of American Geographers (AAG) in Las Vegas, NV; the 90th annual meeting of the American Meteorological Society in Atlanta, GA; and the 64th annual meeting of the Southeastern Division of the Association of American Geographers in Knoxville, TN. He was invited to chair a panel discussion session at the AAG and organized and chaired special sessions on Hydroclimatology.

Rezaul published his research in *Bulletin of the*

American Meteorological Society; Journal of Hydrologic Engineering; Water, Air, and Soil Pollution; and Applied Engineering in Agriculture. He also published a chapter (with Dr. Foster) in a book, titled, "Historical Climate Variability and Impacts in the United States." He has several papers currently in press or in review. Rezaul is pleased to note that many of his papers are co-authored by his graduate and undergraduate students.

Last year Rezaul was appointed as the Editor of *Earth Interactions*. This respected multi-disciplinary journal is jointly published by the American Geophysical Union (AGU), The American Meteorological Society (AMS), and the Association of American Geographers (AAG). In addition, Rezaul has continued to review proposals for the National Science Foundation (NSF) and serve in the editorial boards of *Physical Geography* and *Geography Compass*.

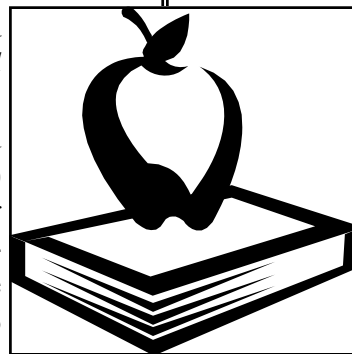
Dr Cathleen Webb (Chemistry) and Rezaul have received funding (\$349,000) from the National Science Foundation for their Research Experience for Undergraduate (NSF-REU) program. The program will allow them to train 36 undergraduate students over three summers (2010-2012). They successfully completed the first summer. Drs Chris Groves and Joshua Durkee from the Department mentored participating students, along with the faculty from the departments of Chemistry and Biology. This is the second round of NSF-REU funding received by Drs Webb and Mahmood. The first round of funding was for 2004-2006.

Dr Stuart Foster and Rezaul have been diligently working on establishing weather and climate observing stations for the Kentucky Mesonet. Due to their tireless efforts, fifty research-grade stations are currently operational across Kentucky. The data can be accessed freely by anyone in near real-time from www.kymesonet.org. The work continues to expand the network and secure long-term operational funding.

Last year Dr Claire Rinehart (of Biology) and Rezaul were awarded \$2.38 million to establish a **High Performance Computing Center**. They are currently working to make this infrastructure operational. This Center will open significant opportunities for faculty from many disciplines in

WKU, including significant research opportunities in weather and climate. Rezaul has also submitted several large competitive grants to the NSF, USDA, and NOAA during the course of last year.

MICHAEL MAY writes that sequence stratigraphy and subsurface and outcrop rock correlation and study have continued, as well as summers immersed in sedimentology at a Superfund site. There are interesting findings surfacing particularly in Edmonson County where Dr. May and students are revisiting a detailed stratigraphic analysis study along the emergency spillway of Nolin Lake. The U.S. Army Corps of Engineers has permitted the investigation in this generally restricted area for Dr May's graduate and undergraduate students working on the ongoing Mississippian-Pennsylvanian unconformity stratigraphic and sedimentologic problems. The spill way was initially studied as part of an investigation by the University of Cincinnati Sedimentology Seminar, which Dr Paul Potter and others published in the late 1970s. With advances in sequence stratigraphy and



armed with different ways of interpreting river (fluvial) sedimentation patterns, Dr May hopes to get more students involved with alternative or at least supplemental interpretations of the Nolin Reservoir Spillway site. He is also planning to provide the Corps with any geologic documentation of the site and help them with possibly updating interpretative signage near the Nolin Dam that would include the investigation at the spillway. Over the past summer Nancy and Chris Toney and a few other students began to work on a project correlating a nearby quarry with the emergency spillway, which included use of the Gamma Ray Scintillometer to create an "outcrop geophysical log" that, in turn, can be correlated to subsurface well logs available online from the Kentucky Geological Survey. Much of this work will be important for hydrocarbon development and protection of groundwater resources in the region.

A new course has been developed for this fall by Dr May entitled Sequence Stratigraphy. Students in this course are exposed to the important concepts of 'genetic' or 'event' stratigraphy that has turned out to

be quite important in understanding the ‘plumbing’ systems associated with rocks or sedimentary deposits that are being investigated for energy and/or environmental reasons. Students are working with online geophysical well logs, core and sample descriptions, in house available rock cores, and outcrops to better understand the basic and in some cases, more subtle and advanced concepts of sequence stratigraphy. Dr May has also been the geology program leader this past year and is working with geology faculty to produce more advanced courses for inclusion in the permanent course catalog. The idea behind creating 500-level courses is to entice honors students, Gatton Academy students, and upper-level undergraduates as well as graduate students to take courses like those in the field like the Bahamas and the Mohave Desert, and campus-based courses such as sequence stratigraphy, tectonics, advanced analytical techniques, optical mineralogy, etc. If such courses are listed permanently, potential graduate students will be better informed about the diversity of course offerings presently not conveyed by one-time offering courses.

Dr May is finishing a solo-author, peer-reviewed book chapter entitled “Oil-Rich Clastics in South Central Kentucky” to be published in an American Association of Petroleum Geologists (AAPG) memoir – *Heavy Oil and Bitumen Systems in Alberta and Beyond*. The Edmonson County area in particular is a focus of this book chapter, including the historical development of bitumen resources in the area, a discussion of the area’s fluvial sedimentology, structural and stratigraphic hydrocarbon traps, and a number of advancing technologies available that may be tried for extracting in place oil that surely would be an economic boon to south central Kentucky.

Mike had a few travels this past year – a couple of trips to California, and trips to the east coast, Texas, and in between, due to summer consulting and May family travelling soccer. He always looks forward to hearing from past students. Please contact him at Michael.may@wku.edu or 270 745-6891.

JASON POLK hit the ground running during his first year in the Department, establishing courses, engaging students in research, collaborating with colleagues, and becoming more familiar and involved

with WKU and the Department. While this left little time for much else, he was able to squeeze in getting married to his lovely new wife, Leslie North, in November and settling into their new home in Bowling Green to enjoy the changing seasons. Dr Polk also spent some time exploring Mammoth Cave National Park and the area’s great caves and karst landscape, while enjoying biking, hiking, and floating along the local scenic spots.

Dr Polk taught several courses this past year, including GEOG 100, 391, and Geomorphology. In the geomorphology course, he led a fieldtrip to Florida over Spring Break with five undergraduate and graduate students to explore the coastal and karst landscapes, which included visiting several caves, springs, coastal aquifer areas, and holding meetings with State forest and Water Management District officials about cave and karst groundwater management issues.

This past summer, Dr Polk, along with faculty members Dr Andrew Wulff, Dr Bernie Strenecky, and Leslie North, co-led a Semester at Sea study-abroad voyage entitled “Waters of the Caribbean” on the *MV Explorer* with eleven undergraduate and graduate students. This involved visiting ten different Caribbean countries over sixteen days to teach students about water resources in various locales using field and lab based exercises, along with lectures onboard a floating classroom! Dr Polk looks forward to teaching Karst Environments and Geoscience Field Methods this Fall, which fit well with his goal of engaging students in meaningful research-oriented learning experiences using field and laboratory experiments within the realm of physical geography and geology. He is eagerly looking for students who are interested in working on projects related to his research areas!

Within the college and department, Dr Polk was involved in several activities during his first year, including being the faculty advisor for the Green River Grotto student organization, participating as a judge for the 40th Annual WKU Student Research Competition and the National Geographic Bee. Additionally, he has become quite active in the Hoffman Environmental Research Institute and is now the Associate Director of Science and involved in its multitude of national and international projects and student engagement activities. 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.

In August, through the work of Dr Chris Groves and other Hoffman Institute colleagues and affiliates, Dr Polk and Leslie North were fortunate enough to participate in a collaborative environmental justice workshop in Wuming County, China, as part of the China Environmental Health Project's outreach and education activities. This workshop was sponsored by the International Research Center on Karst and funded through a grant from USAID to the Woodrow Wilson International Center for Scholars and Vermont Law School. The workshop centered around education about and protection of Ling Shui spring, which provides water for over 100,000 residents in the county. This signified a major milestone in bringing together political parties and environmental groups to address the spring's water quality and quantity issues for the first time in over 1,000 years of recorded history.

In establishing and diversifying a research program, Dr Polk, his students, and the Hoffman Institute were all quite active this past year, submitting several collaborative and individual proposals that were funded by a variety of agencies. He currently is working with graduate student Brandon Porter on a funded project examining anthropogenic karst disturbance in Puerto Rico, which will be completed this Fall. Another funded project has involved several undergraduate and graduate students working on karst groundwater resource inventory and survey in Florida. In May, Dr Polk and graduate student Ben Miller participated in an expedition to Belize to collect samples and data from caves to reconstruct the paleo-climate record of the region as part of a grant-funded project examining drought and environmental issues leading to the demise of the ancient Maya civilization. Dr Polk is working with graduate student Dalene Smith, who received funding from the Karst Waters Institute to study Jamaican karst groundwater hydrogeology using stable isotope and dye tracing techniques to delineate



recharge catchments and aquifer boundaries, which is currently underway. This summer, through funding from USDA, Dr Polk and Hoffman Institute colleagues worked with several graduate students, including his advisee Sean Vanderhof, to collect data on contaminant transport and epikarst characterization at Crump's Cave in KY, part of which are for Sean's thesis research.

Dr Polk currently has several other collaborative research initiatives underway, including work throughout the Caribbean, China, US, and elsewhere related to climate change, karst groundwater resources, and geomorphology. Dr Polk has recently published an article in the *Journal of Cave and Karst Studies*, and currently has in preparation or under review five additional articles this year related to a variety of research topics, as well as wrapping up a book chapter entitled *Long-Term Socio-Environmental Dynamics on the Vaca Plateau*.

Dr Polk is already enjoying a productive start to his second year in the Department at WKU, with several new projects and grant proposals on the horizon, new graduate students to advise, an Honors course to help plan for in the Spring, and assisting with the Hoffman Institute/WKU's International Conference on Karst Hydrology and Ecology to be held in June, 2011. Additionally, he has more globetrotting planned for this year to attend conferences, conduct fieldwork, and nurture collaborations, but also has some projects at home to continue settling into newlywed life in Bowling Green. The upcoming year is slated to be rich with activity and it appears the busy pace will continue for him!

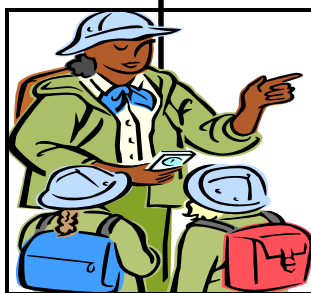
FRED SIEWERS had another good year at WKU. He taught his regular semester courses in Introductory Geology, Earth History, and geological Field Techniques. As in past offerings of Field Techniques, Dr Siewers led his class on a field trip to Pound Gap, a massive road cut in eastern Kentucky that exposes 2000+ feet of Middle and Upper Paleozoic rocks. Students honed their note-taking and section-measurement skills and learned how to

interpret past sedimentary environments. Although past trips to Pound Gap have had interesting weather and vehicle challenges, this year's trip was without incident and a tremendous success. Most on the participants wanted to stay an extra day to explore of the fascinating geology of the eastern Kentucky.

Dr Siewers also offered his Winter Term "Geology of the Bahamas" course on San Salvador Island. This was his fourth offering of this course since 2004 - fourteen undergraduate geology majors participated in the class. In addition to all of the geological marvels and marine science adventures that characterize the trip, this year's Bahamas course also featured explorations of the human history of the island with visits to the ruins of Loyalist plantations. For many in the class, the Bahamas course proved to be life-changing experience. Students around the Department are already asking about the next offering of this popular course.

In December 2009, Dr Siewers had the good fortune to go to China with Dr Chris Groves. Both he and Dr Groves contributed to a workshop on karst geology at the International Karst Research Centre in Guilin and toured field sites and caves in the spectacular karst region of south China. Dr Siewers, along with several faculty in the Department, are developing study abroad experiences for students in China. This trip was Dr Siewers' first-ever trip to Asia. It definitely won't be his last!

Dr Siewers worked diligently on Bahamas' related projects this past year. He was the co-editor and layout director of the Proceedings Volume for the 14th Symposium on the Geology of the Bahamas. He presented results of his ongoing research on Pennsylvanian coal-swamp carbonates and contributed to an MS Thesis and Honors project of two students in the Department. He also became involved in the WKU Honors College, and in Honors education in general, by participating in a Faculty Honors Institute in Las Vegas and Death Valley. He is currently working to create a new Faculty Honors Institute in south-central Kentucky that focuses on the physical landscape and cultural heritage of the region. He loves hearing from students and tries to keep up with as many former students as he can. Drop him a line and let him know what you have been up to!



ANDREW WULFF continued to develop undergraduate research opportunities, be involved at a high level in field-based geology research and learning, and augment the analytical side of "hard rock" geology at WKU. Andrew and his students were active at professional meetings, as they combined for six research presentations at regional to international scientific conferences. Dr Wulff also wrote grants enabling the Department to obtain safe cabinetry for chemical storage, a marble table for stable digital balance, and a new Leica DM 750P polarizing light microscope.

Andrew is currently supervising undergraduates working on projects including igneous petrology/geochemistry of lavas, geothermobarometry of amphiboles from the Black Hills, using geochemistry to source chert artifacts, and a variety of geoscience education projects. He is excited about the recent acquisition of a single-crystal XRD and the refurbishing of the XRF on the south campus, hoping for better access to these important analytical facilities. Dr Wulff will also be working on an EARTHSCOPE project with folks at Illinois State University, leading a workshop developing the principles of magma generation along volcanic arcs, and eruption prediction techniques. Andrew, Jason Polk, Leslie North, and Bernie Strenecky all co-lead the first-ever Semester-at-Sea Enrichment Voyage focusing on "Waters of the Caribbean" from May 26 – June 10. (Please see more about this elsewhere in this edition).

Following the Caribbean adventure, Andrew flew from Aruba to Cody, Wyoming (what a change!), to once again teach three weeks of the summer field geology course with students from nine universities (see story and photo in this edition). Once again, students unraveled the geology of Montana, Wyoming, and South Dakota – and braved snow, sleet, wind, and - beautiful weather this year. Ah, what stories will be told!

Dr Wulff was voted in for another three-year term as a national Councilor for the Council on Undergraduate Research (CUR), and will once again be going to Washington in September to advocate for increased funding for the geosciences. Last year, he had productive meetings with Kentucky's federal lawmakers, and he is looking forward to continuing

these relationships. Much time was spent with the university-wide General Education Review Committee, charged with overhauling the entire General Education program at WKU! He is also the lead faculty in developing an interdisciplinary Science Core course for the Honors College. Every Honors student will take this (and several other core courses) and Dr Wulff is anticipating the challenge in making it broad (and specific), field- and lab-based (for 300 students each semester), fun, rigorous and engaging.

Dr Wulff is committed as ever to bringing more earth science to the K-12 classrooms in the area and he and his students logged well over 1500 contact hours with students (primarily 4th, 5th, and 10th graders) at five schools in two counties and 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.

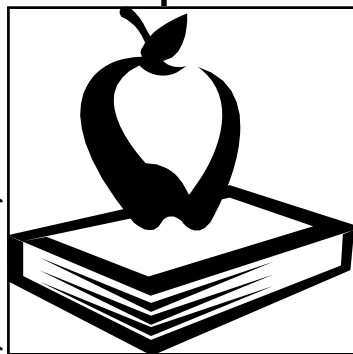
Andrew enjoys the challenges of identifying rocks and minerals brought to the Department by folks from all over the area, which this year included proposed meteorites, sedimentary iron deposits, carbonates of all sorts, fossils, artifacts, and various ores (from Arizona, New Zealand, and Australia!). 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 lessons, with many additional activities to keep Dad running – and young (so they say!).

JUN YAN writes that in the 09-10 academic year he taught a number of upper-level GIS and technique courses. His students were able to work on a variety of real-world projects, including GOBG Transit Analysis, Bowling Green Historical Preservation Project, and the Assessment of Warren County Fire Station Response Time, etc. Some project results were disseminated to the corresponding government agencies and received very positive feedback. In particular, the maps and findings of the GOBG project were adopted by the Community Action of Southern Kentucky to optimize bus schedules and routes, which was later reported by the *Bowling Green Daily News*.

In the past year, Dr. Yan advised several graduate students and one of them successfully defended her thesis, which is related to stormwater runoff monitoring in Karst regions. With the City of Bowling Green as a study area, this project aimed to develop a general procedure in GIS to keep track of the transport of potential stormwater pollution on both the surface and subsurface. Findings from this project can help the city government understand groundwater movement and thus develop more informed stormwater monitoring and sampling strategies.

Dr Yan also had a very productive year with his



research. His 2009 paper, titled “*Visual data mining in spatial interaction analysis with self-organizing maps*”, won the **2010 Michael Breheny Prize for the Best Paper** in a prestigious international journal, *Environment and Planning B*. In addition, he published one paper in an international journal, *Water, Air, & Soil Pollution*. Another paper is currently under review by another international journal, *Environmental Earth Sciences*. Both papers, related to groundwater quality issues in the karst regions of Southwest China, are the results of Dr Yan’s collaboration with Chinese visiting scholars at WKU.

This past summer, Dr Yan collaborated with Dr Xingang Fan (a new faculty member in the Department) and traveled around China for three weeks. The purpose of this exploratory trip was to conduct site investigations for a planned study abroad program in China in the 2011 summer. Drs Yan and Fan visited a number of sites in Beijing, Zhangjiajie, Three Gorges, Chongqing and Guilin (see pictures on previous page). Dr Yan hopes that the program can

offer a first-hand experience of China to WKU students, encourage them appreciate the ancient civilization of East Asia, help them to better understand a variety of contemporary issues in China, and become better prepared for an increasingly globalized world. Dr Yan is very excited about this opportunity to contribute to the mission of WKU as a leading American university with international reach.

Shelby Rader is a Gatton Academy alumna, Honors College student, and Geology major who is studying this semester at Harlaxton College in England. She took the opportunity to visit one of the most important geological sites in all of Great Britain - Siccar Point on the east coast of Scotland near Edinburgh. Siccar Point is important in the history of geology for the observations of James Hutton, who in 1788 used the geology of the area to argue for the vastness of geological time and his theory of uniformitarianism.





Miles (left) and Camden Goodrich



Margaret Crowder, showing the results of a failed liquid nitrogen ‘volcanic’ eruption, at Girls in Science Day 2010

ALUMNI CONTRIBUTIONS

Contributions to the Department of Geography and Geology Development Fund in 2009-2010 stayed steady during the year, a reflection of the tough economic times we face. The number of individual contributions to our Fund neared the 100 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:

Jeffrey W. Allen
CPT & Mrs D. Anderson
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Joseph H. Bishop
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*Special thanks to the
 Leigh Roy Bell Estate*



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“I predict a fantastic 2011 if you send in your Alumni Information sheet right away.....”

ALUMNI NEWS

Alapo, Victoria (MS Geography 1995) is a geography instructor in the Division of Social Sciences at Metropolitan Community College in Omaha, NE. She recently completed a summer trip to Egypt, Turkey, and other areas in the Middle East.

Bergman, Crystal (MS Geoscience 2009) is a Ph.D. student in the School of Natural Resources at the University of Nebraska-Lincoln. She writes that compared to fellow students in her program she has been very well prepared by Department of Geography and Geology faculty for advanced graduate study.

Bluhm, Justin (Geology 2000) works as a geologist for the *Newfield Exploration Company* (NYSE:NFX), an independent crude oil and natural gas exploration and production company headquartered in Houston, Texas. Its domestic areas of operations include the Anadarko and Arkoma Basins of the Mid-Continent, the Rocky Mountains, onshore Texas and the Gulf of Mexico.

Brown, Jonathan “J.B.” (Geography 2005) is an environmental engineer for Daicel Safety Systems America.

Carter, Nicholas (Geography 2003) completed a Master’s degree in Urban Planning at the University of Louisville and graduated from Chase College of Law in 2009. He now practices law in Tompkinsville, Kentucky.

Coleman, Troy (Geography 2007) works for AT&T. He writes that he enjoyed most of the Geography classes he took a great deal. Geography always felt like it widened his view as he learned more, whereas other majors seemed to narrow as a student progressed. He thanks the faculty and staff in the Department, as he uses his GIS and Geography skills every day and they make his life better, which indicates real value to him.

Dycus, Matthew (Geology 2009) accepted a Geotechnical Analyst position with Newfield Exploration

(Mid Continent Division) in Tulsa, OK. He writes "I just wanted to let you know how insanely pivotal GIS skills are in this field."

Finley, Jason (MS Geography 1996) has been promoted to Major, Medical Operations Officer, in the Kentucky Army National Guard.

Gurtler, Jared (Geography 2002) is a Law Enforcement Park Ranger with the National park Service at Congaree National Park in South Carolina.

Hall, Chris (Geology 2001) is a six-year veteran of the petroleum industry. He writes that he's met a lot of geos from some from the "best oil schools around" and he would put a good WKU graduate up against anyone of them. "You should be very proud of our dept, I know I am."

Hawthorne, Kelly (Geography 1996) is an Engineering Construction Coordinator for the Warren County Water District. He is married to DaRhonda Hawthorne and has four children: Mason 10, Sydney 10, Bryce 7, and Jayna 6.

Herera, Juan (Geoscience 2007) is completing his Ph.D. at Purdue University. He liked the friendly environment in the Department at WKU, with approachable faculty and lots of opportunities to do outdoor geology.

Holbrook, Cody (Geology 2005) is a production geologist with the Shell Exploration and Production Company in Houston, TX. Cody writes that he had an excellent experience in WKU Geology, thanks to the faculty and his fellow geology students.

Pelt, Holly (Geography 2004) works for FEMA as an environmental specialist. She was recently deployed to Kentucky for the May flooding and recent flash floods in Pike County.

Phillips, Rachel (Geography 1999) is a planner for Auckland City Environments in New Zealand.

Scott, Julie (Geology 2010) has been appointed to the position of Laboratory Manager and Coordinator of Equipment and Technology for the WKU Department of Physics and Astronomy for the 2010-2011 academic year. Julie is a current member of

the Kentucky Society of Professional Geologists, Society of Physics Students, Hilltopper Astronomy Club, Clay Mineral Society, Geological Society of America, and the Society of Exploration Geophysicists.

Pruett, T. Scott (Geoscience 2000) is writing his Ph.D. dissertation in the Geography program at West Virginia University and teaching part-time at Frostburg State in Maryland.

Snow, Drs Richard and Mary (MS Geography 1996) teach in the Applied Aviation Sciences program at Embry-Riddle Aeronautical University. They are co-authors on the third edition of *Climatology: An Atmospheric Science*, published by Pearson Press.

Thornton, Joseph (Geology 1977) is an Adjunct Professor of Management at Bellarmine University and is working on a Doctorate in Management at Case Western Reserve University.

Timmons, Valerie (Geology 1980) is teaching interdisciplinary courses on the environment at Bellarmine University and loves to give impromptu geology lessons when the occasion arises.

Whitaker, Amanda (Geography 2007) is a forecaster in the United States Navy. She writes that the experience of studying the atmosphere and all the wonders that are created allowed her to take this knowledge and experience and use them to help pilots in the military.

Wilson, Jennifer LeAnn Burns (Geology and Geography 2006) is an environmental scientist with SpecPro Inc. in Florida. She writes that her majors at WKU provided her with useable knowledge and experiences that she could employ immediately after graduating.

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

david.keeling@wku.edu

<http://people.wku.edu/david.keeling/index.htm>

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Mail to: Dr. David J. Keeling, Department Head
Department of Geography & Geology
1906 College Heights Blvd #31066
Western Kentucky University
Bowling Green, KY 42101-1066

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Alumni Information

Name of Graduate _____
(include maiden name)

Major _____ Year of Graduation _____

Current Address _____

City _____ State _____ Zip _____

Occupation _____ Employer _____

NEWS: _____

Mail to: Dr. David J. Keeling, Editor
Department of Geography & Geology
Western Kentucky University
1906 College Heights Blvd #31066
Bowling Green, KY 42101-1066

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Western Kentucky University
1906 College Heights Blvd #31066
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