

DEPARTMENT OF
GEOSCIENCES
COLLEGE OF EARTH AND
MINERAL SCIENCES



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From the Department Head

Dear Alums:

Another year has flown by, and, as always, it has been a productive one for faculty, students and staff of Geosciences. In past newsletters I have described significant achievements of individuals, both faculty and students. So it gives me a lot of pleasure this time to report a true team accomplishment—exceptionally high rankings by US News and World Report 2010. The department ranked 6th among Earth Sciences programs (second of all publics to UC Berkeley), 1st in environmental science, 2nd in geochemistry, 3rd in geology and 8th in paleontology. Even though the rankings are purely based on reputation (ratings of geosciences department heads and chairs), they are very gratifying. Here are some more impressive team numbers: the department's external research funding continues to grow, in 2009-2010 we spent more than \$4.4 million from externally funded projects. This funding has led to growth of our graduate program, with 30 new students arriving at University Park in fall 2010. Numbers of undergraduate students are holding steady, and we continue to excel in general education with over 14,200 credit hours in 2009-2010.



We have some other exciting team efforts to report about. Our first cohort of Fort Valley students, LaMichelle Arnold and Enrique Perez recently completed MS degrees in the department. They made it through two BS degrees and an MS in seven years, and we are extremely proud of both of them. The FVSU program is a true team effort most of all with our close colleagues in Georgia including Drs. Ike Crumbly and Jackie Hodges (who is now ABD in educational management), but also with a number of generous corporate sponsors. Our partnerships with North Carolina A&T and Jackson State are also thriving based on the hard work of Professors Andy Nyblade and Tanya Furman and their colleagues at A&T and JSU.

At the graduate level, our new Masters of Education in Earth Sciences has graduated its first student, and currently has 28 students in the program. Professor Eliza Richardson is working closely with teachers on research projects, and she and other faculty have developed a suite of courses that attracted 87 total enrollments this year. Not bad at all!

And last, but of course, not least, are you, our alums who help our team through your continuing generosity. In late April, we had an extremely festive fundraiser for the 2010 geosciences field camp at the home of Reg and Freda Spiller in Houston and also hosted by Rick Abegg, Dennis Comis, John Leftwich, Roland Sauermann, and their spouses. The event was very well attended, with about 30 alums and their spouses. Most significant, we raised over \$5,600 for this year's students. We made 12 awards based on a combination of need and merit, and our students were very grateful for the financial help. Even though budgets are tight and tightening, we try to keep a full range of field trips running because of their importance in education. This year we led extended trips to Wallops Island, the Berkshires, the Denver basin, and a wonderful spring break trip to New Zealand, courtesy of Shell (see report in this issue).

So, on behalf of the team of faculty, staff and students in Geosciences, thanks for your continuing generosity to all of our programs and my best wishes.

Yours,



Timothy Bralower

Field Camp Retrospective

“Ah, the Glories of Geology Field Camp”

It's about 10 am on a sunny day in June of this year, and we're sitting on a ridge of the Parkman Ss in Elk Basin, Wyoming. From up here the double-plunge of the Elk Basin anticline is a thing of beauty, made all the more sublime (for us at least) by the nodding heads of numerous oil wells. The work of uncountable rainstorms has etched out hogbacks of variably resistant strata, so that parasequences and topography have become one and the same. But what has our attention at the moment is a mapping team of two Penn State Geosciences undergrads. They are standing next to a 5 m high wall of Virgelle Ss covered by slickenlines. Through our binoculars we see them gesticulate, hands in the plane-of-bedding, hands in the plane-of-the-fault, fingers pointing this way and that. It's the ritualized hand-dance of the field geologist drawing meaning from rocks and dirt. Finally they commit some lines to their field maps, agree on their next move, and scramble up the wash and out of sight.

The students are enrolled in a course called Field Geology I, an Introduction to Field Methods, or as readers of this newsletter undoubtedly called it, “Field Camp”. Since 2005 and the introduction of a Geobiology major, the Penn State Field Camp has been divided into two parts, Geosc 472A, an introduction to geologic field methods; and Geosc 472B, advanced field methods, the 3-D characterization of earth structure, and the reconstruction of geologic histories. Each is three weeks long for a total of six credits towards the degree. For the traditional Geosciences BS degree, both courses are required, because they are considered a junior-level capstone experience before the students specialize their senior year. Only Geosc 472A is required for the Geobiology degree, and neither is required for the Geosciences BA degree.

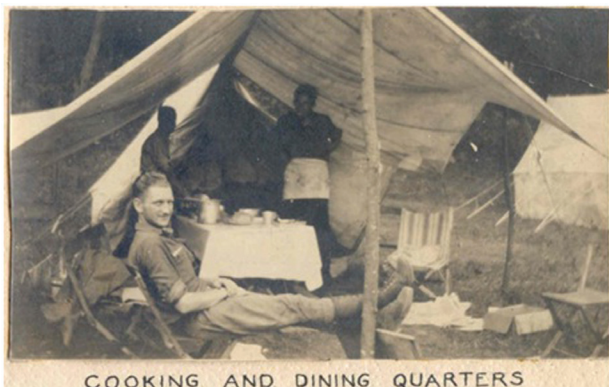


Figure 1. Penn State Geology Field Camp circa 1925, probably in Bedford County, PA

Field Camp at Penn State has a long and storied history. For details, see the Field Camp website maintained by Professor

Emeritus Dave Egger at: http://www.geosc.psu.edu/alumni/field_camp/index.htm. The first required summer field geology course lasting more than one week was listed in the College General Catalog in 1919-1920 (Fig. 1). By 1932-1933 a course called Summer Field Geology was taught near Bedford, PA, and lasted eight weeks. In 1942, during World War II, the camp moved to University-owned property about 15 miles from University Park (Stone Valley). As reported by Professor Fred Swain, one of the instructors of that era, students mapped in teams of four using Brunton compasses and aerial photos and created their own topographic maps by surveying with a plane table and alidade. Like today, the mapping involved soil interpretation, topographic expression, measuring dips and strikes, and structural cross-section sketches, with graduate student assistants and faculty constituting the teaching staff. The momentous decision to move our Field Camp from Pennsylvania to the intermontane west came in 1961. Professor Rob Scholten was mapping near Lima, Montana, and the superb exposures made it a good place to teach field skills (and, it turns out, teach students how to compete successfully in the Wild Cow Milking Contest at the Lima Fair). By 1965 our camp was staying at YBRA (Yellowstone Bighorn Research Association) and the Elk Basin mapping project was initiated (by Professor Russ Dutcher). In the intervening 45 years, Penn State students have continued to enjoy campfires along the Beartooth Front and make sense of the faults and slickenlines in Elk Basin (Fig. 2).



Figure 2. 2010 Field Camp Class in Elk Basin.

But the tools of the trade have evolved. Students still use Bruntons, rock hammers, 10x hand lenses, and good old 10% HCL. But instead of making topographic maps with a plane table and alidade they are provided with laptop computers, arcMAP software, and a geographic information system (GIS) consisting of digital elevation models, high-resolution orthorectified aerial photos, and georeferenced 1:24,000 USGS quadrangle maps. Each mapping team receives (Continued on page 13)

Faculty & Alumni Awards and Honors

Professor Richard Alley

Richard Alley has been elected a Fellow of the American Academy of Arts and Sciences. This is one of the world's most prestigious honorary societies, on par with the National Academy, so it is yet another huge honor for Richard. The AAAS is broad in scope and includes the sciences, the humanities and the arts, business, public affairs, and the nonprofit sector. By the way, Richard joins Jim Kasting who was elected fellow in 2008. Richard's legacy keeps growing and growing.



Professor Chris Marone

Chris Marone won the Wilson Award for Excellence in Research for his wide range of accomplishments in rock mechanics, with applications to our understanding of fault zones, earthquake triggers and subglacial processes.



Professor Kate Freeman

Kate Freeman has been named a Fellow of the John Simon Guggenheim Memorial Foundation. The fellowship is highly selective (180 awards made from over 3000 applicants), and Kate is being supported to work on her project "Plants, water and carbon during extreme greenhouse climates" for twelve months starting July 2010.



Professor Eliza Richardson

Eliza Richardson received the G. Montgomery and Marion Mitchell Award for Innovative Teaching for her pivotal role in revitalizing the MEd degree in Earth Sciences and innovation in working with adult professionals.

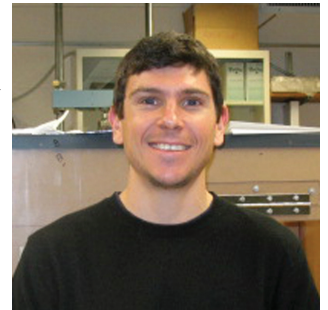
Professor Kevin Furlong

Kevin Furlong was recognized for his commitment to service during his 25 years at Penn State.



Professor Demian Saffer

Demian Saffer has been chosen to receive a highly prestigious Friedrich Wilhelm Bessel Research Award from the Alexander von Humboldt Foundation. The award is intended for internationally renowned junior scientists and scholars in recognition of their outstanding accomplishments in research to date and their exceptional promise for the future. The award will enable Demian to spend time at the University of Bremen during his sabbatical year.



Professor Eric Kirby

Eric Kirby has been awarded a very prestigious fellowship from the Alexander von Humboldt Foundation to support a one-year sabbatical at the University of Potsdam. Eric will be working on a project entitled Landscape, Climate and Mountain Building in the Andes, along with Professor Manfred Strecker.



Reginal Spiller, MS '79

On Wednesday, October 13, 2010, Reginal W. Spiller, chief operating officer for Allied Energy Corporation in Houston, was honored with a 2010 Alumni Fellow Award. The Alumni Fellow Award is the most prestigious award given by the Penn State Alumni Association. Administered in cooperation with Penn State's academic colleges and campuses, the program provides recipients the opportunity to return to campus to share their knowledge and expertise with the University community.

Meet Our Students

Kristin Morell PhD Student

I arrived at Penn State in August of 2004, after graduating from Wellesley College with a BA in Geology. I started my graduate studies in the MS program under the supervision of Don Fisher, and at the time had no real intention of pursuing a PhD degree. My MS was focused on mapping and constraining shortening in a young and active thrust belt within the Central American convergent margin near the Panama-Costa Rica border. After several field seasons in Central America and really enjoying my work, I decided to pursue a PhD at Penn State after obtaining my MS degree in 2006.

For my PhD I've expanded my work to look at the fluvial response to subduction dynamics within an extinct volcanic arc in Costa Rica. I've also looked at deformation and rapid uplift on the Burica Peninsula, an outer forearc peninsula only ~30 km inboard of the Panama triple junction, using geologic mapping and dating of marine terraces. All of this research, which is funded primarily by the NSF Tectonics division and a generous scholarship from the Alfred P. Sloan Foundation, has involved spending nearly nine weeks a year in the field, with many hours spent hiking in the jungle.

Currently, I'm spending the month of July analyzing deposits created by Volcán Barú, an active volcano in western Panama. We are studying the most recent sector collapse from the volcano, which, based on preliminary volume estimates, make it potentially the largest sector collapse ever recorded within the western hemisphere.

I will be graduating this December and plan to hold a postdoctoral research position at the Arizona State University at the beginning of next year.



Brittany Grimm Undergraduate Student

As I started applying to colleges during my senior year of high school in Bucks County, PA, I had no specific major in mind as long as it fell under the broad realm of "science." After gaining acceptance to the College of Earth and Mineral Sciences, I visited Penn State and was immediately assured that the Department of Geosciences was a perfect fit. The department has continuously provided me with many opportunities to travel while furthering my education, including two field camps, a trip to Denver as part of the Geobiology course, and a trip to New Orleans to participate in an AAPG conference.



I attended my first summer field camp after my sophomore year when I traveled to Coldigioco, Italy, with Dr. Dave Bice. We explored the geology of the Umbria-Marche region, the metamorphic and ophiolite complexes in Tuscany, and the KT boundary in Gubbio. I am currently writing this piece while on my second six-week field camp, during which Drs. Slingerland, Fisher, and Bice have taken over thirty students cross-country to study in Utah, Wyoming, Idaho, and Montana.

When I return for the fall semester, I will continue working on my senior thesis in vertebrate paleontology, advised by Dr. Russ Graham. We are conducting Rare Earth Element (REE) analysis on a rib bone and several scapulae from an extinct sloth from Iowa. It is our hope that we will be able to determine if diagenesis affects the uptake of REEs in bone, as it does for isotopic analysis. After graduating, I plan on pursuing a Master's degree in paleontology at an as-of-yet undecided university. As president of the Geological Sciences Club starting my senior year, I'm sure my studies in the department will continue to provide even more opportunities and excitement.

Student Awards and Honors

Undergraduate Awards

The Barton P. Cahir Award Endowment in Earth and Mineral Sciences: Stephanie Taylor
The Benjamin F. Howell, Jr. Award in Geosciences: Jonathan Marin, Sam Bydlon, Muhammad Ajwad Azizan
Donald B. and Mary E. Tait Scholarship in Microbial Biogeochemistry: Timothy Gould, Genevieve Elsworth, Stephanie Taylor, Christine Speers, Muhammad Azfar Mohamed Anuar, Daniel Mills, Richard Dabundo, Claudia Shuman, Devin Tierney
The Frank Dachtel Memorial Award in Geochemistry: Dana Drew, Ted Present, Stamatina Hunter
The James and Nancy Hedberg Scholarship in Geosciences: Matthew Mahalchick, Stephanie Cook, Greg Drelich, Martin Ackley, Dean Reynolds, Nina Bingham, Muhammad Azfar Mohamed Anuar, Jill Mailloux-Huff, Michael Hegemann
The Joseph Berg Award for Undergraduate Research in Geosciences: Nate Stevens, Genevieve Elsworth, Brittany Grimm
The Robert F. Schmalz Award in the Department of Geosciences: Erica Folio, Michael Cronin
The Scholarship from the Arthur P. Honess Memorial Fund: Vincent Edwards, Lindsey Anderson, Kevin Ogorzalek, Sara Fritz, Anthony Moscatello, Darrell Ritsick, Christopher Simpson, Andrew Ryan
The Scholarship from the Ronald A. Landon Endowment in Hydrogeology: Nate Wysocki, Lara Haluszczak

Forty-one students participating in the Summer 2010 Geosciences Field Camp received awards from the following funds:

Thomas F. Bates Undergraduate Research Enhancement Fund
David P. "Duff" Gold Undergraduate Scholarship Fund in Geosciences
Kappmeyer-Isaacs Field Camp Award
Earl S. Lenker Fund for Field Studies in Geosciences
Edwin L. Drake Memorial Scholarship
David M. Demshur Undergraduate Research Endowment in Geosciences
Reif Undergraduate Summer Field Camp Endowment

Graduate Awards

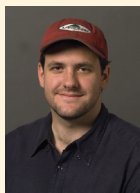
Bunton-Waller Graduate Award: LaMichelle Arnold and Enrique Perez
Chevron Research Travel Awards: La Michelle Arnold, Jamie Brainard, Tim Fischer, Matt Legg, Clayton Magill, and Melissa Pardi
ConocoPhillips MS Fellowship: Rebecca Boon
ConocoPhillips PhD Fellowship: Jon Schueth
EMS Centennial Research Travel Award: Clayton Magill
ExxonMobil Fellowship: LaMichelle Arnold
Funds for Excellence in Graduate Recruitment (FEGR) Assistantships: Lauren Milideo
Geosciences Graduate Student Colloquium Presentation: Aaron Diefendorf and Bryn Kimball
John C. and Nancy Griffiths Scholarship in Geosciences: Matt Legg
Marathon Alumni Centennial Graduate Fellowship in the College of EMS: Rachel Piotraschke and Ryan Swanson
John Meacham Hunt Graduate Student Award in Petroleum Geochemistry: Reed Bracht
Charles E. Knopf, Sr. Memorial Scholarship: Claire Fleeger and Heather Graham
Kraus Crystallographic Research Award from the Mineralogical Society of America: Andrew Wall
Arnulf I. Muan Graduate Fellowship: Beth Herndon and Dan Hummer
NSF Graduate Research Fellowship: Knut Christianson, Becky McCauley, and John Mischler
Hiroshi and Koya Ohmoto Graduate Fellowship in Geosciences: Patrick Applegate and Chira Endress
Outstanding Student Paper Award at the AGU Fall Meeting: Clayton Magill and Maggie Popek
Scholten-Williams-Wright Scholarship in Field Geology: Alicia Cruz-Urbe and Becky McCauley
Shell Geosciences Energy Research Facilities Award: Heidi Albrecht, Colin Carney, Brett Carpenter, Heather Graham, Dan Jones, Bryan Kaproth, Clayton Magill, Enrique Perez, Leah Schneider, Heath Watts
George H. K. Schenck Teaching Assistant: Brian LeVay
Donald B. and Mary E. Tait Scholarship in Microbial Biogeochemistry: Matthew (Moshe) Rhodes

We greatly appreciate the generosity of the many contributors who make these awards possible!

42nd Annual Graduate Student Colloquium

Please join us in recognizing the outstanding achievements of the following students:

Oral Presentation by a Ph.D. Student
(Post-Comprehensive Exam)



First Prize Award
Tim Fischer



Second Prize Award
Aaron Regberg



First Prize Award
Clay Magill



Second Prize Award
Ashlee Dere

Oral Presentation by an M.S. Student



First Prize Award
Melissa Pardi

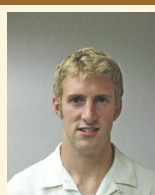


Second Prize Award
Sarah Barrett

Energy-Related Presentation



First Prize Award
LaMichelle Arnold



First Prize Award
Matt Legg

Poster Presentations



First Prize Award
Jamie Brainard



Second Prize Award
Mike Cleveland



Second Prize Award
Christine Regalla

We would like to thank the Shell People Services Division of Shell Oil Company and Chevron for their donations of prize money and their generous financial support.

The 43rd Graduate Student Colloquium will be scheduled for April 2011.

Student Research

MS Student's Experiments Shed Light on Isotopic Fractionation in Underground Caves

Khadouja Harouaka, a second-year geosciences Master's student, is interested in the Big Picture—the origins of life.

Working with Assistant Professor Matt Fantle, Harouaka is applying her undergraduate chemistry degree to the study of calcium isotopes in gypsum deposits in the Frasassi karst cave system in Italy. Her goal: To determine whether calcium isotopes can be an indicator of biogenic processes on Earth and other planets. "Gypsum is the ideal calcium-bearing mineral to be utilized as a biomarker because of its stability, relative insolubility and its single cationic oxidation state," Harouaka said. "And the Frasassi caves are ideal, too, because they possess newly forming and ancient gypsum deposits. Plus the environmental conditions are constant year-round."

Born in State College while her father was earning his Ph.D. from Penn State, Harouaka grew up in Saudi Arabia where she attended a small, government-run school for expatriates—her graduating class numbered only 15. She returned to the area to attend Penn State, graduating in May 2007.

Harouaka traces her interest in geochemistry to a class taught by Hiroshi Ohmoto that she took as an undergraduate. Opportunities to be trained on state-of-the-art instrumentation and modeling techniques sold her on geosciences.

This past summer, Harouaka was awarded a Center for Environmental Chemistry and Geochemistry Fellowship to investigate gypsum growth rates and the chemical properties of the solutions from which gypsum grows in order to explain differences in morphology and calcium isotopic fractionation in the sulfidic Frasassi caves. The mineral composition of those caves creates conditions for the growth of microbial or snottite communities that are highly acidic and resemble slime.

The hypothesis is that the interactions of these snottites with the gypsum deposition may create a biogenic signature in the calcium isotopes of these minerals, Harouaka said.



Khadouja Harouaka, Geosciences MS Student

What she learned was that "a change in the morphology of the gypsum deposits occurred as a function of saturation states, where solutions of low saturation precipitated larger needle-like crystals and solutions of higher saturation precipitated much smaller and flatter crystals," Harouaka said. "This is significant because the cave waters are mostly undersaturated in gypsum, and yet the caves possess gypsum deposits that resemble the small crystals grown in the saturated solution."

Harouaka's future work includes reproducing the crystal growth experiments in solutions that mimic the water chemistry in the caves. If the same results can be obtained from crystals grown in these solutions, then this may be the first clue to a non-inorganic growth mechanism of the gypsum in the caves.

Margaret Hopkins, EESI

New Zealand Field Trip

Tectono-Sedimentary Framework of New Zealand's Frontier Basins

During March 4-16, 2010, as part of a graduate research seminar, 8 PSU Geosciences graduate students traveled to New Zealand with Professor Kevin Furlong and undertook field-based research on the geologic signature of plate boundary processes as recorded in sedimentary basins. A fundamental goal of the research seminar was to develop an understanding of the history and related hydrocarbon potential of frontier exploration basins associated with complex plate boundary evolution. Travel and field-work costs were primarily underwritten through generous support from Shell Oil and the Department of Geosciences.

New Zealand provides a unique opportunity to study basin evolution in a complex plate boundary system. The plate boundary through New Zealand has a Cenozoic to present history including extensional, transpressional, and subduction tectonics. A series of basins have developed in response to this history, and subsequent and ongoing basin inversion exposes key components of these basins' histories. Recent progress in plate tectonic studies of New Zealand's evolution provide key kinematic constraints and a conceptual tectonic framework for placing basinal observations into transferable, process-based basin models.



Jam Roll section (Late Miocene, Mt Messenger Formation) showing substantial mass transport deformation [PSU Grad students, Rachel Piotraschke and Bryan Kaproth]



The PSU team at the Franz Josef Glacier [L to R: Xuhua Shi, Russell Rosenberg, Matt Legg, Megan Pickard, Ying Cui, Nikki West, Rachel Piotraschke Front: Bryan Kaproth]

There were two main foci to our studies - analyses of (1) the basin systems (the sink) that develop in response to plate boundary processes, and (2) the development of the plate boundary orogen (the source) that both drives the development of accommodation space and provides materials to infill the basins. Utilizing this source-to-sink model for frontier basin development provides the framework to place basin evolution (and the development of hydrocarbon potential) into a tectonic framework model that is transferable to other modern and ancient frontier basin systems.

Much of our field study in New Zealand was in conjunction with faculty and graduate students from Waikato University (Hamilton, NZ) and University of Canterbury (Christchurch, NZ). In addition to the sharing of science expertise among the PSU and NZ students, this field collaboration also provided international networking opportunities for our students as they embark on their professional careers. We would particularly like to thank Professor Peter JJ Kamp (Waikato) and Dr. Mark Quigley (Canterbury) for sharing their time and expertise with us in the field, allowing us to collaborate with their students, and providing geologic opportunities and experiences that few visitors to New Zealand get.

Professor Kevin Furlong

Iceland Research

Penn State Geoscience Research in Iceland and the 2010 Eruption of Eyjafjallajökull Volcano

Iceland is a land of fire and ice. Scenic glaciers cover some of the island's most active volcanoes, which have produced the largest historical eruptions of lava on Earth. The combination of these two natural phenomena during subglacial eruptions can have devastating results for local and global populations. The 2010 eruption of the Eyjafjallajökull volcano in Iceland has been a less-than-subtle reminder that the forces that have shaped our planet and atmosphere can be at once beautiful and awe inspiring, yet also disastrous. Penn State Geosciences has a long history of studying the tectonics and volcanology of Iceland. Emeritus Professor Dr. Barry Voight and students investigated the tectonics of northern Iceland in the mid-1980's and Assistant Professor Dr. Peter La Femina and students have been studying the active tectonics and magmatism of southern Iceland for ten years.



Halldor Geirsson, Peter LaFemina and Diana Roman (University of South Florida) installing a temporary broadband seismic station at Hekla Volcano, Iceland in the summer of 2010. A continuous GPS station can be seen towards left in the background. Hekla erupted last in the year 2000, and it is anomalous in its low seismicity and complex deformation pattern.

On June 15, 2009, Halldor Geirsson, now a graduate student in the department, noted an increase in seismicity and a change in direction of Global Positioning System sites located around the Eyjafjallajökull volcano. The

GPS sites were now moving outwardly, away from the volcano, indicating the injection of magma beneath the volcano. This would be the third time in 15 years that Halldor and his colleagues at the Icelandic Meteorological Office, including Penn State Geosciences alum Dr. Kristin Vogfjord, detected the migration of magma under the glacially clad volcano. Like in the two previous events in 1994 and 1999, the migrating magma stopped after several months. This quiescence would not last long. In December 2009 magma again began migrating beneath the volcano, and this time it would not stall beneath the surface. The magma continued to migrate until it erupted on March 20, 2010. The initial phase of the eruption took place on two short fissures on the northeastern flank of the volcano and produced fantastic fire fountains, lava flows and lava falls. On April 14, 2010 the eruption moved to the glacial-covered summit crater. The subglacial eruption that ensued was very explosive and sent an eruption column of steam and fine-grained ash to over 20,000 feet in elevation and a glacial outburst flood (or jokulhlaup in Icelandic) down several river valleys. The ash cloud had a severe impact on air-travel, causing the closure of airports across Europe and stranding travelers for over a week. This summer, La Femina and Geirsson teamed-up with Kristin Vogfjord to study the active Hekla volcano and check out the damage caused by the Eyjafjallajökull eruption. Geirsson is co-author on a Nature article to be published about the eruption.



A view towards SE of Eyjafjallajökull on May 8th, 2010 during the summit eruption. The otherwise shining white ice-cap is now covered with tephra. Glacial outburst floods from ice melting in the summit crater have disrupted the outlet glacier going from the crater to the lowlands.

Professor Peter La Femina

Hydrogeophysics Field Course

Hydrogeophysics Field Course Gives Students Hands-on Lesson in Surface Water Contamination



Penn State graduate student Heather Tollerud and Danielle Norcini, Penn State sophomore, compare images of a stream from an infrared and standard camera



Stephanie Troutman, Fort Valley State University senior, and Kamini Singha, Penn State Assistant Professor of Geosciences, attach connectors to electrical resistivity cables

With half-a-dozen bags of ice, 200 milligrams of sodium chloride and $\frac{1}{2}$ cup of non-toxic blue dye, a headwater creek became a demonstration site on the geophysics of surface water pollution. Nine students from three universities dumped 55 gallons of salty, blue and chilled water into the stream that meanders through the Leading Ridge Watershed in Penn State's Stone Valley Experimental Forest. Then, using data loggers, an infrared camera and electrodes, the students measured the concentration of the "contaminants" as they flowed downstream, as well as their effect on stream temperature and subsurface electrical properties. "Tracer tests—like the one we did—are key to understanding the processes controlling how contaminants are transported in both surface and ground water," said Kamini Singha, Assistant Professor in Geosciences, who designed the demonstration as part of her three-week Hydrogeophysics Field Experience course. Singha's goal is to introduce undergraduates to some of the fundamental problems that exist in hydrogeology—problems such as the transport of pollution and the movement of water in fractures—through hands-on field work. So, as part of the curriculum, students conduct pumping tests, use ground-penetrating radar and collect downwell information on changes in fluid and rock properties. Singha also includes classroom exercises as students analyze data using numerical modeling. For several of the students, the course provides their first field experience. "It really helped me understand the lectures and books," said Adella Dexter, a senior from Jackson State University in Mississippi, who is majoring in Earth Systems Science Education. She added, "This kind of hands-on learning leads to more study and more inquiry and discovery." The Hydrogeophysics Field Experience course is supported by the National Science Foundation as part of Singha's NSF Early Career grant. This is the school's second year. Besides Jackson State University, participating students were from Fort Valley State University in Georgia and Penn State.

Margaret Hopkins, EESI



Penn State senior Adam Wlostowski downloads data from in-stream fluid conductivity data loggers

Alumni News

Bob Folk, '46 BS, '50 MS, '52 PhD

Well things roll around. Prof. Earle McBride and I are studying with the SEM East Texas Kaolins. Harkens back to when I took beginners mineralogy (Min. 31) from Tom Bates back in spring 1944--he got me interested in clays and also the electron microscope. We are assessing the role of {nano}microbiology in precipitating kaolins...the answer seems to be Yes!

John J. Kelley, '58 BS

John was appointed Professor Emeritus at the 2010 commencement of the University of Alaska Fairbanks. Dr. Kelley had 40 yrs of service on the faculty of the School of Fisheries and Ocean Sciences and Institute of Marine Science. He will continue to pursue projects at the university related to Arctic offshore oil and gas issues and marine science online instruction. Dr. Kelley served on the PSU GEMS board in the 1990's.

Jeffrey R. Parsons, '61 BS

I retired in 2006 after 40 years on the faculty of the Dept. of Anthropology and Museum of Anthropology, University of Michigan, where I am now an Emeritus Professor/Curator. I continue to work on completing the final monographs for several archaeological field research projects that I directed between 1969 and 2003 in Mexico and Peru. I've made several return visits to Penn State over the years, most recently in April 2010, mainly to confer with archaeologist colleagues in the Departments of Anthropology and Landscape Architecture. I usually drop by for a look at what I used to know as the Mineral Industries and Mineral Sciences buildings (I think both now have new names). I miss the old Armory Building, a classic piece of period architecture. Last year I had a nice reunion with Rob Scholten and his wife at their home over in Boalsburg.

Lawrence Drew, '64 MS '66 PhD

Lawrence received the Krumbein Medal from the International Association for Mathematical Geology.

Doug Nichols, '70 PhD

Doug, a well known palynologist, passed away on Jan 21, 2010 following complications from surgery. Doug was a well-loved and highly-respected figure in the geological and paleontological communities both locally and internationally. He received his PhD before working as a college professor (Arizona State and SUNY Geneseo) and as an oil company geologist (Chevron) before joining the U.S. Geological Survey in 1978. He retired from the USGS in 2006 and continued his active research program as a USGS scientist emeritus, as research associate at the Denver Museum of Nature & Science, and as senior editor of the international Journal Cretaceous Research. Doug

had broad interests and had conducted research in North America, China, Russia, Mongolia, Japan, and Egypt. He studied the palynology of the Cretaceous and Paleogene and was famous for his work on the Cretaceous-Tertiary boundary. In 2008, he published a book with Cambridge University Press entitled *Plants and the K-T Boundary*. Doug was a Fellow of the Geological Society of America, past-president of the American Association of Stratigraphic Palynologists, a popular speaker at WIPS and a member of the Friends of Dinosaur Ridge. His gentleness, patience and wry humor will be much missed by all those who knew him. He is survived by his wife Jan, son Ken (Spiny), daughters Joyce and Amber, and granddaughter Samantha.

Jeffrey Pepper, '71 BS

I started my freshman year at PSU as an Electrical Engineering Major in 1967. I had such a fascination with science and the outdoors as a kid and, during my Sophomore year, I decided to switch to Geological Sciences as a major, because I thought I'd rather be using science to spend time outdoors and to "play with dirt, rocks and water," than to be thinking about electrons spinning around in wires. My Masters degree was in Engineering Science at PSU; and it was weighted towards Hydrology and Soil Mechanics, and included Dr. Parizek's Quantitative Hydrogeology Course. Thanks to PSU's Geosciences Dept. I've had a great 39 year career working for government agencies and in consulting as a hydrogeologist and engineering geologist. Currently, I'm back working for a government agency, the Susquehanna River Basin Commission as a Hydrogeologist.

Kenneth Krupka, '71 MS, '84 PhD

Kenneth passed away on March 25, 2010, after an eight month battle with pancreatic cancer. He started his career with Pacific Northwest National Laboratory in October 1980. Professionally, Ken had 30 years of research experience in geochemistry and mineralogy related to radioactive and hazardous wastes at Hanford. He showed a great passion for science, which he used to solve complex environmental problems. He made significant contributions to science, enhancing the understanding of radioactive waste forms and associated environmental impacts. Ken was known by his colleagues as an expert in geochemistry and complex mineral systems. In 2009 the Waste Management Conference recognized his achievements by selecting his work for the Best Oral Paper award. The scientific community has benefited from his hard work and dedication. Ken loved the outdoors, and he and his loving wife, Adele, took many ski trips during the winter and enjoyed fishing trips in the summer months. Ken also enjoyed visiting with his mother and sister who live in Maine. One of his greatest joys was traveling back to Maine, where Ken

Alumni News

and his wife fished for small mouth bass and white perch on various lakes in the eastern part of the state. Playing softball was a favorite activity in his younger years and also with co-workers later on. More recently, Ken spent many hours becoming proficient in digital photography.

Ken is survived by his loving wife of seventeen years, Adele; his mother, Louise Krupka of Limestone, Maine; sister, Sharon (Frank) Witherell, of Lewiston, Maine; mother-in-law, Lorene Lindstrom; brothers and sisters-in-law, Steve and Diane Lindstrom, Ron and Melody Curfman, Bob and Dinah Curfman; and numerous loving nieces and nephews. government agency, the Susquehanna River Basin Commission as a Hydrogeologist.

James H. Anspach, '77 BS

James has been appointed Chairman of the American Society of Civil Engineer's Board Committee for Codes & Standards. He has also been appointed Investigator for three utility-related National Academy research projects.

Robert J. Bodnar, '85 PhD

Dr. Robert J. Bodnar, C.C. Garvin Professor, University Distinguished Professor of Geosciences at Virginia Tech received the Virginia Scientist of the Year for 2009. The presentation was made by the Governor of Virginia at a reception in Richmond in late January, 2010.

Ira D. Sasowsky, '88 MS, '92 PhD

I received the Distinguished Service Award from the Geological Society of America Hydrogeology Division in fall of 2009. In spring 2010 I received the Karst Waters Institute Service Recognition Award, and began a 2nd term as co-editor for the journal Environmental and Engineering Geoscience. I continue to teach at University of Akron (15 yrs), and enjoy seeing old friends from the department when possible.

Keith Saroka, '93 BS

Keith has completed his 17th year teaching middle school science in the Interboro School District, his 11th as department head. He recently moved to West Chester, PA and is married with 3 children (hopefully all future Penn Staters).

Scott Snyder, '94 BS

Scott has recently accepted a position as Director of Environmental Services with Jonas and Associates, a consulting firm based in Martinez, California (SF Bay Area). He will be based out of San Diego, primarily serving the Navy with plans to reach other market sectors and regions. He is also the immediate Past-President of the San Diego Association of Geologists. If graduates are planning on relocating to California or the San Diego area, they are welcome to contact him at geologist@psualum.com.

Erik de Roos, '95 BS

As of January, 2010, I have a new position as Geophysicist and Data Manager at HiPoint Reservoir Imaging. The birth of first child, a son named Alec also born in January.

Attn: Irvin Hall Alumni

The Irvin Hall Reunion will be held April 23 during Blue/White weekend. The reunion is being sponsored by the current students of Irvin Hall and the Earth & Mineral Sciences Interest House Alumni Interest Group.

(continued from page 3) a hand-held GPS, from which waypoints and tracklines can be downloaded directly to their GIS. In addition, their computers come equipped with graphics and computing software and a word processor for writing reports. Although students still map in the field on topographic and aerial photo basemaps, they prepare their final maps using the GIS software and print them in color on 11x17 inch paper using portable printers carried along with the camp.

Currently, the Penn State Field Camp prides itself on offering a diverse set of geological exercises at field locations selected to provide exercise-appropriate outcrops. Students taking the complete camp start their field training by learning sequence stratigraphy in the Book Cliffs of east-central Utah. The strata are superbly exposed in the cliffs and many of the Exxon-Mobil sequence stratigraphic principles were first tested there. Surficial or Quaternary mapping is taught near Tooele, UT, and in south Salt Lake City at the mouth of Bells Canyon where glacial lake and alpine glacial deposits are well exposed. Bedrock mapping of sedimentary, volcanic, and plutonic rocks is taught in Elk Basin, WY; Wildhorse, ID; and Alta UT. The course is rounded out by two neotectonic studies that use fault scarps to estimate the timing of paleoearthquakes and an exercise on contact metamorphism and heat flow. We also lead side field trips through Yellowstone National Park, Chief Joseph Scenic highway/Beartooth Pass, and Craters of the Moon National Monument. As our exercises have incorporated new methods for documenting and analyzing field data, one thing has remained the same for the last 50 years: field camp continues to provide a capstone experience that incorporates the principles of our core Geosciences curriculum in the spectacular mountainous settings of the Western US.

Professors Don Fisher and Rudy Slingerland

Contributors to Geosciences July 2009-June 2010

Rick & Michelle Abegg
Richard & Cindy Alley
Lance Anderson
Charles Angerman
Michael Arthur & Janice Jenkins
Robert & Barbara Avakian
John & Susan Bahr
Vanessa L. Balint
Lamont & Christel Beers
Joseph & Glenda Berg
Jeffrey Berta & Teresa Royek
Claude Bolze
James Bonelli & Meryl Towarak
Annette & Richard Borkowski
Timothy Bralower & Mary Lee Kerr
Charles & Patricia Brinkley
Richard & Judith Brown
Robert Brozdowski
John & Karen Campbell
Richard & Donna Campbell
Robert Cohen & Karen Stierman
Dennis & Carmen Comis
John Darcy
Gay & Michael Deamer
David Diodato
Joshua Dorin
James Doutt
William & Karen Downs
John & Deborah Ehleiter
James T. & Janice Wicks Engelder
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Karl & Cathy Evans
Martin Farley
Kevin Furlong
Tanya Furman & Daniel Larson
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Thomas Gebbie
Marston Giddings Jr.
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Thomas and Marsha Wachs
Timothy Watson
Matthew Werner, III
Robert and Barbara Williams

Thank you for supporting our programs!

Marcellus Gas Shale

Department of Geosciences and the Marcellus Gas Shale

The Department continues to reap the benefits of being on the academic forefront during the breakout years of the Marcellus gas shale. Geosciences faculty are involved in the leadership positions in two Marcellus-related initiatives. First on the scene was the Appalachian Basin Black Shale Group (ABBSG), which in an early incarnation was initially sponsored by industry, mainly Range Resources and Talisman (Fortuna). ABBSG is presently a collaboration among three Geosciences faculty (Terry Engelder, Rudy Slingerland and Mike Arthur). ABBSG has grown in sponsorship with affiliate members including Range, Talisman, Chesapeake, Southwestern, Shell, Unconventionals, and Enerplus. ABBSG has also received support from Chevron, ConocoPhillips, CNX, Hess and Samson.

Within the past year, the University constituted the Marcellus Center for Outreach and Research (M-COR) with Mike Arthur and Tom Murphy (Ag Extension) as co-directors. M-COR is the research, information and education leader for the Appalachian region by fostering, supporting, and advancing research and research-based outreach on gas shale development. M-COR will inform and serve the diverse group of stakeholders involved with or affected by the exploration and production of natural gas, including landowners, local government, business, natural resource organizations and the natural gas industry. M-COR is supported by the College of Agricultural Sciences, the College of Earth and Mineral Sciences, the Penn State Institutes of Energy and the Environment (PSIEE), the Social Sciences Research Institute (SSRI), Penn State Outreach and the Earth and Environmental Systems Institute (EESI).

ABBSG has grown with the recruiting of a number of talented graduate students, including LaMichelle Arnold (MS complete), Murat Aydin, Reed Bracht (MS complete), Travis Call, Dan Kohl, and Yunhui Tan. The central focus for ABBSG over a pilot stage was the drilling of complete Marcellus cores from the Valley and Ridge

of PA. ABBSG now has in hand nearly 5,000 feet from six core holes, including one from the deep Appalachian Plateau. This core material is being used by a number of our graduate students in their graduate research.

ABBSG held its first annual affiliates meeting on October 11, 2010 at the Nittany Lion Inn. The affiliates group spent the morning of October 12 in the ABBSG core lab. The agenda for the affiliates meeting included a presentation of several reports, including:

1. Tectonic and Stratigraphic Overview of the Appalachian Basin ABBSG Stratigraphic and Sedimentologic Studies
2. Stratigraphic and Sedimentologic Studies: Sequence Stratigraphy of the Hamilton Group
3. Geochemistry of the Proximal Union Springs Member of the Marcellus
4. Sequence Stratigraphy of the Genesee black shale ABBSG Physical Properties and Fracture Studies
5. Internal Deformation and Slip Surfaces in the Marcellus Fm.
6. Fracture Toughness of the Marcellus Fm.
7. Hydraulic Fracture Stress Measurements from the RPSEA Program ABBSG Thermal Maturity Studies
8. Fluid Inclusions in the Marcellus Fm.
9. Vitrinite Reflectance in the Marcellus Fm.



Appalachian Basin Black Shale Group core from the Marcellus Formation of central Pennsylvania. This core has been tectonically deformed as indicated by the vertical fibrous growth on pyrite nodules, tectonic cleavage wrapping around a concretion, and a calcite-filled fault zone

Professor Terry Engelder

The newsletter was prepared by Timothy Bralower, Dept. Head, and Lisa Guiser. For comments or suggestions, please contact Lisa at alumni@geosc.psu.edu or 814-863-7072.

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