

Department of
GEOSCIENCES

College of Earth and
Mineral Sciences

Newsletter 2013

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From the Department Head



How often in our pursuit of career excellence do we pause to look back and acknowledge the pivotal influence mentors have had in our lives? Probably not often enough.

As an experiment over the last year, I queried my colleagues in the hallways of Deike Building and at receptions at national meetings, asking them why they became geoscientists. Almost without exception they trace that initial spark to a particular mentor, often a teacher they had in middle or high school or in their first year or two of college. In my case, that person was Mr. David Astin, science teacher at Golden Valley High School in suburban Minneapolis. Mr. Astin had those key attributes of an influential educator: a passion for what he did, an abounding interest in the success of his students, and a willingness to go beyond the confines of the classroom or the school day to make sure his students experienced the wonders and excitement of scientific discovery. He encouraged me to do field work on deer foraging over holiday break, he obtained a permit for us to collect road kill, and in a particular act of trust, he facilitated my study of the effects of SO₂ emissions on plants in a mesocosm I built. Unfortunately, it leaked and the school had to be evacuated. Not unexpectedly, the plants shriveled up and died. As Will Rogers said, "Good judgment comes from experience, and a lot of that comes from bad judgment." I acknowledged Mr. Astin in my dissertation, and thanks to Google just tracked him down to renew that show of appreciation. Perhaps you can do the same with your first or most influential mentor.



Mr. David Astin, science teacher at Golden Valley High School in suburban Minneapolis.

In this issue we hear about other successes in mentorship. Alumnus Doug Heller writes an open letter to Professor Emeritus Gene Williams, letting him know how influential he was as Doug was developing his skills as a geologist. Professor Mike Arthur writes about a former student he mentored, alumnus David Pinkus, who is a shining example of this generation's Mr. Astin: David recently was nominated for New Jersey Teacher of the Year. Current graduate student Nooreen Meghani credits her first and most enduring mentor, her mother, for her initial interest in science and the faculty at Wellesley for their guidance that led her to Penn State. And we announce the recipient of our first endowed professorship, Assistant Professor Liz Hajek. The endowment was established by Roland and Debra Sauermann in recognition of the astute mentorship of Roland by Professor Rudy Slingerland.

Maybe it's something about being in the post-middle-age-crisis phase of my life, but it has become clear to me that the most important accomplishments in one's career, short of receiving the Nobel Prize, are the positive influences we can have on the lives of others. We need to "pay forward" the critical mentorship we received earlier in our lives. Effective mentorship is an acquired skill. I'm learning that it must be subtle, almost subliminal, especially with young colleagues who are self-motivated, entrepreneurial, and committed to making it on their own. It arises from an essential concern for the long-term well-being and success of others. And it's only rewarding if one is equally happy celebrating those successes with the often-private recognition that you made a difference.

Sincerely,

Lee Kump
Professor and Department Head

Geosciences Newsletter is a publication of the Department of Geosciences in the College of Earth and Mineral Sciences at The Pennsylvania State University.

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Faculty Awards



Richard Alley was given the American Association for the Advancement of Science 2012 Public Engagement with Science Award in early 2013.

Also, in May 2013 he was given an Honorary Doctorate of Science from the University of Wisconsin.



Michael Mann received the National Conservation Achievement Award in the Science category, National Wildlife Foundation, awarded in October 2013. In addition, he received honorable mention for Green Book Awards, for “The Hockey Stick and the Climate Wars.” Dr. Mann was also appointed Distinguished Professor as well as being elected Fellow of the American Meteorological Society.



Susan Brantley was awarded an honorary doctorate by the University of Lausanne, Switzerland.



Rudy Slingerland received the G. K. Gilbert Award for Geomorphology from the American Geophysical Union for pioneering the quantitative modeling of coupled sedimentary, tectonic, and geomorphic processes. Dr. Slingerland was also elected as the Fellow of the American Geophysical Union.



Elizabeth Hajek is the inaugural recipient of the Rudy L. Slingerland Early Career Professorship. The professorship is provided to her in recognition of her outstanding early-career accomplishments and her promise for the future.



Peter Wilf received the George W. Atherton Award for Excellence in Teaching, named for the seventh president of the University (1882-1907). The award is presented each year to four faculty members University-wide who have devoted substantial effort to undergraduate teaching.



Katherine Haines Freeman has been elected to membership in the National Academy of Sciences for her excellence in original scientific research. Membership in the NAS is one of the highest honors given to a scientist in the United States.



Professor Emeritus Barry Voight has been selected as the 2013 recipient of the Thorarinnsson Medal of the International Association of Volcanology and Chemistry of the Earth's Interior. The medal is the highest honor of this organization, given only every four years to recognize fundamental contributions to research in volcanology.

2013 Graduate Colloquium Awards

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

First: Jon Schueth --Jon will give next year's Peter Deines Memorial Lecture
Second: Mike Cleveland

Oral Presentations by a Ph.D. Student (Pre-Comprehensive Exam)

First: Jason Boettger
Second: Elizabeth Denis

Oral Presentation by an M.S. Student

First: Christine Doman
Second: Mike Donovan

Poster Presentation

First: Marsella Kachingwe
Second: Katelyn Olcott

Energy Related

First: Laurence Bird
Second: James Cederberg

These candidates were selected from an impressive group of participants. We want to thank Shell Corporation for the continued support of Colloquium with prize funds and general support.

Graduate Scholarships and Awards

Krynine Memorial Award: Leah Brandt, Ellen Chamberlin, Angela Chung, Alicia Cruz-Uribe, Ying Cui, Ashlee Dere, Bryan Kaproth, John Leeman, Florence Ling, Noreen Meghani, Lisa Merkhofer, Katelyn Olcott, Christine Regalla, Marco Scuderi, and Robert Valdez.

Shell Geoscience Energy Research Facilitation Award: James Cederberg, Ellen Chamberlin, Nicholas Holschuh, James Johnston, John Leeman, Courtney Swanson, Robert Valdez, Jiuyuan Wang, Anna Wendt, and Nathaniel Wysocki.

Chesapeake Energy Scholarship in Geosciences: Yunhui Tan, Thomas Johnston, Katie Olcott, Ashlee Dere, and Leah Brandt.

Charles E. Knopf, Sr., Memorial Scholarship: John Leeman, Beth Meyers, Lauren Milideo, Jason Boettger, and Muammar Mansor.

Hiroshi and Koya Ohmoto Graduate Fellowship: Piyali Chanda, Elizabeth Denis, and Florence Ling.

Richard Standish Good Graduate Scholarship: Max Christie and Kyle Rybacki.

John C. and Nancy Griffiths Scholarship: Leah Tsao.

Richard R. Parizek Graduate Fellowship: Robert Valdez and Yipeng Zhang.

ConocoPhillips Graduate Fellowship: Laurence Bird.

Barry Voight Endowment: Halldor Geirsson.

Scholten-Williams-Wright Scholarship in Field Geology: Khadouja Harouaka and Xuhua Shi.

John Meacham Hunt Award in Petrology and Geochemistry: Anna Wendt.

Teaching Assistant Award: Nooreen Meghani.

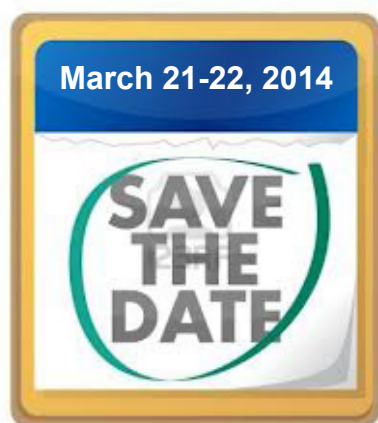
Geological Society of America, Graduate Student Research Grants: Ying Cui, Ashlee Dere, Robert Valdez, and Jiuyuan Wang.

EMS Centennial Graduate Research Award: Ashlee Dere.

NASA Earth and Space Science Fellowship: Khadouja Harouaka.

NSF Fellowship Recipient: Kiya Riverman

2014 Graduate Colloquium



Undergraduate Scholarships and Awards

Baker-Hughes Scholarship Award: Molly Cain and Casper Hui.

Barton B. and Mary E. Tait Scholarship in Microbial Biogeochemistry: Brandon Cannone, Zachery Richard and William Rosenow.

Benjamin F. Howell, Jr., Award: Muhammad Syazwan Adzhar and Emma Babcock.

David M. Demshur Undergraduate Research Endowment: Nur Syahidatul Abilah, Logan Adams, Ryan Creitz, Eric Guth, Rebekah Hoffner, Gregory Stanek and Ziran Wei.

David P. "Duff" Gold Undergraduate Scholarship Fund: Chelsea Carter, John Considine, Alexis Golestani, Nathan Meier and Elizabeth Roddy.

Earle S. Lenker Fund for Field Studies in Geology: Daniel Barley, Scott Karduck, Nathan Sonnenthal and Colleen Warley.

Edwin L. Drake Memorial Scholarship: James Hemmerly, Alexandra Henry, Tessa Hettesheimer, Rachel Kronyak, Cory Lader, Kaitlyn McMullen, Shane McWilliams, Emily Merkle, Brandi Niles, Mathew Schon, Hanna Quinn, Chevus Turner, Rajvi Amin, Tramond Baisden, Patrick Cassidy, John Considine, Alex Craig, Everett Criswell, Ariel Curtis, Travis Darney, Nicole Flynn, Amanda Fobes, Steven Frank, Jennifer Gaylord and Morgan Haas.

Frank Dachille Memorial Award in Geochemistry: Nelisa Ameera Mohamed Joeharry and Erin Peeling.

James and Nancy Hedberg Scholarship: Timothy Harper, James Hemmerly, Rebekah Hoffner, Raleigh Koeberle, Alexandra Pearce, Peter Vigilante and Ziran Wei.

Joseph Berg Award for Undergraduate Research in Geosciences: Molly Cain, Casper Hui, Michael Tenteromano, and Mohammed Arif Zulkhan.

Kappmeyer-Isaacs Field Camp Award: Muhammad Syazwan Adzhar, Khairunnisa Alias and Reese Davis.

Newfield Exploration Scholarship Award: Michael Tenteromano and Troy Giel.

Reif Undergraduate Summer Field Camp Award: Muhammad Syazwan Adzhar, Ryan Creitz, Nelisa Ameera Mohamed Joeharry, Alexandra Pearce, Ziran Wei and Aiman B Mohd Zuhali.

Robert F. Schmalz Award: Nur Syahidatul Z. Abilah, Khairunnisa, David Blank, Nicole Flynn, Caitlin Kupp, Soniya Liu and Hanna Quinn.

Scholarship from the Arthur P. Honess Memorial Fund: Muhammad Syazwan Adzhar, Emma Babcock, Sandra Cannon and Nelisa Ameera Mohamed Joeharry.

Scholarship from the Ronald L. Landon Endowment in Hydrogeology: Ryan Creitz.

Thomas F. Bates Undergraduate Research Enhancement Fund: Angela Bertangi, Eric Guth, Mohd Rizal Bin Lai and Han-Cheng Yu.



Paying it Forward

An Open Letter to Professor Emeritus Gene Williams

Preface by Professor Emeritus Barry Voight: Gene Williams has relocated from State College to a nursing home in Indiana, PA. He has advancing dementia and his short-term memory is poor, but his long-term memory could be worse. He is happy there, at least as much as possible under the circumstances, and gets attention from his son and daughter-in-law, who live nearby. He seems much improved over his condition prior to his relocation and able to take correspondences. A former undergrad, Doug Heller, who appreciated Gene's assistance in his career, recently wrote a note to Gene, reproduced here. Gene very much appreciated his note and remembered him. I found him quite able to converse on the telephone. I'm sure it would build his morale to get a letter now and then from colleagues and students and some of you might even say hello if you travel that way. Gene's address is Gene Williams, c/o: Bethany Place (nursing home), 1305 Wayne Ave., Indiana, PA 15701. His telephone number is (724) 349-0400.

September 20, 2013

Dear Professor Williams,

My name is Doug Heller and I was one of your students at Penn State many years ago. (My yearbook picture enclosed.) I only had the pleasure of being your student for two years in 1978 and 1979, but your teaching and sage advice during my junior and senior years at Penn State have lasted a lifetime. I graduated in 1979 with a BS in Geosciences; I am now 55 and a successful oil and gas industry professional in Houston, thanks in large part to you.

We spent a remarkable summer together in 1978 at Field Camp in Alta, Utah. For me, it was a summer of taking ownership of my future profession with a passion that still burns deeply within me today. When we were in the field, you made outcrops speak. Your energy and enthusiasm, even after a long climb to some remote location, was contagious and listening to you articulate details about exposed stratigraphic sections was like magic. You had a great way of making the Wasatch front-range come to life and your grasp of its geologic history was awe-inspiring.

You also did a great job of getting students to think critically in a way that few professors can, in my experience. Without giving away the mysteries of the complex geology of the area, you forced students to wrestle with their observations and do the science, thereby taking ownership of their projects. Like putting together a huge jigsaw puzzle one small piece at a time, the big picture would emerge, but you let us do the work until we figured it out. Thank you for being such a remarkable field geologist, teacher and mentor.

I remember several times sitting on an outcrop with you and a few other students, having our usual peanut butter and jelly sandwiches

for lunch while discussing deep philosophical matters. I was always impressed by your ability to challenge students to think philosophically as well as geologically. Science was one thing, but the philosophy of life in general was always fair game for discussion with you. I never knew who enjoyed it more, you or the students. You knew, as all great teachers do, that there was much more to life than the obvious subject matter being taught. I don't remember much of our philosophy discussions other than I enjoyed them immensely and somehow knew I was better off for having shared a PB&J sandwich with you! It was all part of the magic of my junior year and the summer Field Camp of 1978 in particular; thank you Professor Williams, you were the best.

My senior year was filled with the usual anxieties of what would happen after graduation. I had interviewed with all the major oil companies during the fall of 1979 and was focused fully on going to work rather than graduate school. It seemed like all my classmates were going to grad school and somehow I just knew I needed to go start my career. I think I probably had 4 or 5 interviews with nothing but rejection letters to follow. Soon, it was late February with graduation only a few months away and I felt like a ship without a rudder. Only Texaco remained as a slight possibility. The interview had gone well, but that had been months ago and I had heard nothing since. Frankly, I was depressed and nobody seemed to care very much.

I remember vividly stopping by your office after class one rainy, gray March afternoon without an appointment. I desperately needed to talk to someone and while you were not my official "advisor," I knew I could always talk with you. You were just that kind of professor and your door was always open.

I sat down in your office and probably just

Professor Emeritus Gene Williams
Wasatch Fault



unloaded about not knowing where my life was going. You asked if I had applied to any grad schools and I replied, somewhat embarrassingly, "no" because my parents didn't have that kind of money. You nodded and simply said, "Well, young man, what is it you want to do?" with all the confidence and precision thinking of a military leader taking charge. I told you about all the rejection letters and about not having heard back from Texaco. Then, your eyes lit up. You began shuffling papers around on your desk and finding what you were looking for, you began to smile. "Well, they obviously are still interested in you because they just sent me a letter requesting a reference on you. I was stunned and excited to still have the hope alive of going to work for a major oil company. Peering over your reading glasses, you looked me directly in the eyes and said, "Soooo, do you really want this job?" Of course, I said "YES!"

You no doubt wrote quite a reference letter because they offered me a position with

the Offshore Gulf of Mexico group in New Orleans several weeks later, which I gladly accepted. I started at Texaco that summer and so launched what has become a remarkable career. I remained there for 8 years, moving up the ranks from an exploration geologist into management and then left Texaco to work for an energy investment banking firm in Philadelphia (without an MBA...you had convinced me such things were unnecessary during one of our philosophical discussions on an outcrop in Utah somewhere). In 1991, I started my own energy investment firm which works to restructure and turn around underperforming oil and gas companies. That was 22 years ago and it's been an incredible journey, one I wouldn't trade for anything.

Throughout my career, I have often wondered how differently things might have turned out for me if I had not had that first opportunity at Texaco. It was the beginning of a wonderful career track for me and was the foundation for much of what would come later.

I thank you from the bottom of my heart for taking the time to coach a young kid who badly needed your wisdom, for being an outstanding example of the kind of man I wanted to become, and for writing that reference letter to Texaco. I will always be grateful for your impact on my life and I just thought you should know.

Thank you for everything you have done, not just for me but for the many students whose lives you have touched. Thank you for the legacy you have left at Penn State; the Department of Geosciences has done a great job in recent years reconnecting alumni, professors and other friends of the Department and you continue to be a great legend within the Department and among the alumni, more than you know.

You are a remarkable man on many levels and I will always treasure our times together in the field and in the classroom. Thank you again for everything, Professor Williams.

Here's wishing you all the best,

Doug Heller



Alumnus Doug Heller in the late 70's.

David S. Pinkus – Alumnus

David S. Pinkus received his BS in Geosciences in 1998 from Penn State. At that time, David indicated to me that he was not planning to go on to graduate school. I was disappointed! By all indications, he was a very good student, a really nice person, loved geology, fieldwork, and was technically quite capable. I thought he was selling himself short. What would he do with his considerable potential?

David had completed a very nice Senior Thesis with me on paleotemperature analysis of Maastrichtian calcareous fauna (belemnites, foraminifers) from the NJ coastal plain—samples that he collected himself. (David is from NJ.) His thesis research drew, in part, on the analytical experience that he had gained after working nearly four years in my stable isotope lab, operating a mass spectrometer for carbon and oxygen isotope analysis. David began working in my lab in his Freshman year (1994) and contributed to a number of projects—he was instrumental in producing a very nice data set for late Ordovician carbonates from Nevada that led to a published paper on which he was a co-author (Kump and others, 1999, *Palaeo3*). David was always a bit shy, but brightened up when discussing his data and their interpretation and I thought that his reluctance to continue with graduate work was due to a lack of confidence and possibly to my lack of skill as a mentor. Then, after a couple of years, I lost track of him.

Imagine how tickled I was to recently learn that David was named Monmouth County Teacher of the Year for 2013-14; he is one of seven candidates for New Jersey Teacher of the Year. He also received the 2012 Siemens Founders Award for support independent student research in STEM and named one of the Veritas Prep 40 Under 40. He has been teaching high school physics for the past 13 years, the last seven of which were at the prestigious Biotechnology High School, Monmouth County Vocational School District (according to US News & World Report, the number eight best public high school in the country).

David's dedication to inquiry-based learning at the high school level has led him to spend additional time over the past summer doing research at the Oak Ridge National Laboratory (ORNL) as part of the Siemens Teachers as Researchers (STARs) program and training as an advocate for Citizen Science in the Classroom at a conference in Chicago. David recently wrote "...One of the major criticisms of science education in higher education is that the "fun" is missing from the undergraduate experience, particularly in the first year or two. My experiences in your lab ensured that the fun was always there. Working with authentic data is something that is so key to maintaining student interest in STEM." David, we are proud of you, and hope to see some of your students here at Penn State soon! Oh, by the way, there is another small twist to David's mass spectrometry experience -- having used a certain mass spectrometer was a key conversation starter on the first date with his wife-to-be, Marian Westley, an oceanographer, who had experience with the same mass spec! David and Marian were married in 2010, and have a son, Ok you lab nerds—not to fear, there is likely someone out there for you too!

Michael Arthur
Professor of Geoscience

Alumni Passings

| | | | |
|-------------------------------|-----------|------------|------------|
| Mrs. Doris Bye Ferm..... | MS | 1949 | 5/3/2013 |
| Dr. James S. Kahn..... | MS | 1954 | 7/27/2013 |
| Dr. Amalendu J. Majumdar..... | PhD | 1958 | 8/4/2013 |
| Mr. Donovan B. Kelly..... | BS..... | 1963 | 5/2/2013 |
| Mr. Chester J. Billings | MEd | 1965 | 5/3/2013 |
| Mr. James H. Richardson..... | BS..... | 1965 | 4/3/2013 |
| Mr. Robert Doyle Stiner | BS..... | 1965 | 7/10/2013 |
| Mr. Steven F. Clore | BS..... | 1983 | 5/15/2013 |
| Dr. David M. Diodato | MS | 1989 | 3/14/2013 |
| | PhD | 1998 | |
| Dr. Mark D. Jancin | PhD | 2010 | 10/19/2013 |

In the Spotlight

ALUMNUS

Alumnus Gavin Hayes Awarded Penn State Alumni Achievement Award

Gavin P. Hayes (PhD '07) was awarded a 2013 Alumni Achievement Award, which recognizes Penn State Alumni 35 years of age or younger for their extraordinary professional accomplishments. As part of the award, recipients return to campus and share their expertise with current students. Gavin, who first came to Penn State Geosciences as an undergraduate exchange student from the University of Leeds in the UK, returned to Penn State after completing his undergraduate degree, and received his PhD in Geosciences in 2007.

Dr. Hayes was recognized as an Alumni Achiever for his contributions to our understanding of earthquakes, and most importantly for helping lead a transformation in the activities of the U.S. Geological Survey's National Earthquake Information Center (NEIC) that has fundamentally changed their ability to respond to large damaging earthquakes. The NEIC is responsible for monitoring and assessing earthquakes, nationally and globally. In the minutes following a major earthquake, the NEIC is the primary source of information for government response, public awareness, and scientific data. According to leaders at the USGS, as a result of Gavin Hayes' contributions, the NEIC is now "... faster, more accurate, and more complete in their description of the quake and its estimated impact."

Gavin returned to campus in mid-April 2013 to receive this award and in addition to the celebrations, he met with current students and faculty, presented a public lecture on the earthquake response work of the USGS, and led a dynamic real-time response activity for our students. Taking advantage of the capabilities of our new Active Learning classroom (see companion article), Gavin led a Natural Hazards class through a real-time response to a major (simulated) earthquake near Puerto Rico. Using the same data, tools, and time frame available to the scientists at the NEIC, the class assessed the impacts of the earthquake and its tsunamis; determined likely patterns and magnitudes of damage, injuries, and fatalities; and produced a suite of evolving alerts and informational packets as the consequences of the event unfolded. This was done in real-time and with awareness of the critical importance of getting this information to emergency response teams quickly.

The 2013 cohort of Alumni Achievement Awardees is a small but impressive group; in addition to Gavin, this year's group included a White House national security advisor, several CEOs, and the NY Times social media editor. We are proud of Gavin's accomplishments. His award is well deserved. It is gratifying to see the impact that Penn Staters are having on society.



MS STUDENT

Nooreen Meghani

When I was a kid, my mom was always picking up rocks and making up stories about them – “This is a dinosaur footprint! This is a meteorite!” – and we’d go to geologically important and interesting places in the summer, like the Grand Canyon and Dinosaur National Monument. When I got to Wellesley, I was pretty sure I wanted to study Astrophysics, but took an intro geology course on a whim. Long story short, I was hooked! Every subsequent class I took confirmed the sense, in my mind, that I was studying something real, that was happening before humans and would continue to happen long after.

Before I realized it, I was a senior looking at the end of my studies. I realized I didn’t want it to be over! I wanted to keep learning! Keep exploring! Keep discovering! And my then advisor, the inimitable David Hawkins, suggested Penn State and Eric Kirby to me, the former as a good-sized and high-powered department with a lot of very interesting research happening and the latter as a scientist who explored the overlap between fields, the very thing that fascinated me most. And here I am!

My current research focuses on active tectonics in the Sub-Himalaya, examined from a geomorphological perspective. I recently gave a poster at GSA on the Baisahi Anticline of the Siwaliks and I’d love to talk you through it if you’re interested! If you aren’t, I’ll just tell you that our analysis suggests shortening on the Main Frontal Thrust Fault at this location is 12-18 mm/year. (It’s amazing what you can learn from erosional systems!)

Other than research, I have TAed every semester I’ve been at Penn State—from intro to field camp. I love teaching and I know that it’s what I want to do in the future – inspire and expand other minds in the way that I was at Wellesley through coursework and research and simply encouraging people to open their eyes. Because being a geoscientist is awesome! And it’s nice to be able to take home to my mom real dinosaur footprints.

PHD STUDENT

Rosie Oakes

My interest in geology began on a high school geology field trip to the Lake District, England. Standing in the bottom of a glacial valley, looking at the small stream that was running through the base of the valley, the realisation hit; this valley had not been formed by this river. To understand how the valley had been formed, I had to imagine what this landscape would have looked like over ten thousand years ago. I was captivated and, much to the irritation of everyone around me, started questioning how all the landscapes around me had been formed.

I decided to pursue my new-found interest and headed to the University of Edinburgh, Scotland, to study Physical Geography and Geology. There, I was taught about things that I'd never even thought about before. After taking a class in oceanography, I was hooked and challenged myself to understand this huge and complex system. Unsurprisingly, I hadn't managed to achieve this by the end of my BSc and so moved to the University of Toronto, Canada to study for my MSc under Dr. Uli Wortmann. He encouraged me to question everything I knew about the ocean system so that I could gain a better understanding of the fundamentals of ocean nutrient cycling.

After I had completed my MSc, I still had more questions. Studying nutrient cycling had made me wonder how these changes affected the organisms in the ocean. These questions brought me here, to Penn State, last September, where I am now working towards my PhD under the supervision of Dr. Tim Bralower. My research is focused on how changes in carbon dioxide concentrations in the atmosphere affect marine plankton with calcium carbonate shells in the ocean. This work is based on how plankton have reacted to CO₂ changes in the past, but the results can be used to help predict how plankton will react to CO₂ changes in the future. I am thoroughly enjoying being part of this focused, collaborative department. With such a wide range of topics being studied and an open environment for discussion, who knows where my next research questions will take me...on second thought, I should probably just finish this PhD first!



UNDERGRADUATE STUDENT

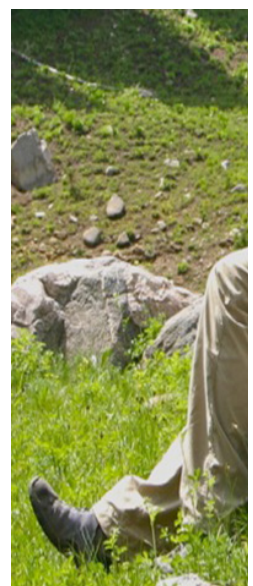
Brianna McClure

I am currently a fifth-semester senior double majoring in Earth Sciences and Environmental Resource Management (The College of Agricultural Sciences). I grew up in Pottsville, Pennsylvania. Before attending Penn State, I was a pharmacy student at a small school. After becoming intensely interested in climate change science, I realized that I wanted to study environmental and earth sciences. I chose to double major because I was unsure of what exactly I wanted to do with my new found interests (and I wanted to try everything).

Penn State was the only school I applied to as a transfer student and I was thrilled to begin my new studies as part of a top geosciences department with some of the world's best researchers. Although double majoring is a significant amount of extra work, the transition was very easy for me. Between the welcoming students, small school feel of the department, and the personable faculty, I quickly found my niche in geochemistry. I had always loved lab and field work and spent much of my first semester here looking for different opportunities. The first of these was as a research assistant for the Sue Brantley lab group. I worked extensively on the groundwater geochemistry of Shale Hills CZO and helped out with other projects. This position led me to look further into geochemistry opportunities at Penn State.

That November, I was fortunate enough to meet with Lee Kump and take part in a research trip to Fayetteville, NY, to help his research team study meromictic Green Lake. Before I knew it, I was writing an undergraduate thesis on the dynamics of the methane profile through the water column of the lake. I enjoy my research because it applies knowledge acquired from both of my majors, including aspects of limnology, chemistry and biology as well as the use of such skills as statistical analysis. I plan on presenting my research at the AGU Fall Meeting this December, just before graduation. Next fall, I hope to begin a Masters Degree in Geosciences.

Geosciences Field Camp 2013





Once again, our undergraduates in the Geosciences and Geobiology BS majors headed west in late May for the hands-on, real-world field experience that is Geosc 472—Field Geology, or as it's affectionately known, Field Camp. The 46 campers this year composed the largest class since 1983 when 52 students headed west. But unlike Penn State students in the 1980s, this year's group reflected at least five different nationalities, ethnicities, and cultures and comprised 28% women, indicative of the increasing diversity of students completing degrees in the Geosciences.

The school began with four Teaching Assistants shepherding the students to Price, UT where they measured, correlated, and interpreted strata in the Book Cliffs. From there the group convoyed to the YBRA field station in Red Lodge, MT, to map the Elk Basin Oil Field, an exercise that has been a Penn State tradition since 1965. Next came a new exercise near Jackson Hole, WY—Quaternary mapping of 11 km² from the base of the Grand Tetons up to the snow line. Following a tour of Yellowstone National Park, the students camped for a week in the Challis National Forest of Idaho where they mapped volcanic rocks and extensional faults of the northern Basin and Range province. After camping for a week, the group traveled down to Alta, UT, in Little Cottonwood Canyon where the students relaxed in nicely appointed ski condominiums for their last two exercises. Traverses in the steep cirques of the canyon were aided by relatively low snowfall in Utah during Winter 2013. In the first exercise, they mapped complex relationships in the classic western US Paleozoic passive margin strata to define Sevier thrust structures. In the second, they identified the sedimentary formations and structure near the edge of the Alta Stock (a small Miocene granitic batholith), located lines of equal metamorphism based on the appearance of certain index minerals, and from those lines estimated peak temperatures as a function of distance from the contact between the stock and the carbonate country rock. The peak temperatures were then used to understand the process of heat transfer associated with the cooling of the stock.

Student response to field camp remains as enthusiastic as ever (which the faculty continues to believe is not a reflection of the Stockholm syndrome). Said one student, "If it looks like a duck and quacks like a duck, then it's a biotite." For more information about our 2014 Field Camp, contact Don Fisher at: dmf6@psu.edu. For a retrospective on field camp's past, point your browser to: http://www3.geosc.psu.edu/alumni/field_camp/index.htm.

—Professors Don Fisher, Maureen Feineman and Rudy Slingerland



Clockwise from Top: Mapping partners in Challis National Forest; Top of the Beartooths; vigilant Teaching Assistant; students modeling their safety gear in Elk Basin; a cold day in the Book Cliffs (all photos by N. Meghani)

Active Learning in Geosciences

Active Learning is a very popular and high visibility term in education these days and when appropriately incorporated into the curriculum, it can provide an effective means to help our students develop the tools and understanding to solve complex problems. But we have a raft of challenges to exploit this increasingly important mode of learning - both in our teaching facilities and in our educational mindset. In Geosciences at Penn State, we are working to overcome limitations in these areas.

At this point, many of you are probably thinking: "We had lots of activities when I was a student in geosciences; most of my classes had labs, I went on numerous field trips, I worked in one of the research labs, and I spent six weeks in field camp!" Certainly, any or all of those activities can be part of an Active Learning curriculum. There are two aspects of Active Learning (as an approach to improved education) that distinguish it from simply being lab or field work. First, effective Active Learning is characterized by being 'authentic'. By that we mean engaging students in doing what is really done in our science - making sure that our activities reflect the reality of our science and this often involves collaboration. For example, our goal is not simply for students to be able to name three fault types, but rather for students to develop an understanding of how faults work so they can apply that knowledge to real-world problems outside the classroom. If you want to apply your understanding to real-world situations, then in the Active Learning model it makes sense to gain that knowledge through real-world (authentic) activities. The strong research focus in our department provides a foundation to make our hands-on activities (whether in labs, the field, or the classroom) truly authentic. We simply need to incorporate what we actually do into our teaching. The other fundamental aspect of Active Learning is that it has a large

component of discovery embedded into it. This is really another side of authenticity as much of our work in science is discovering solutions to problems or questions. It takes time to discover things and so course content may be reduced, but the understanding and ability to use this knowledge is greatly enhanced.

This brings us to the other major impediment to embedding Active Learning in our courses - the classroom! Most classrooms at Penn State are designed for passive learning. The professor lectures from the front of the room and students sit in neat rows and listen attentively (or not). To overcome the barriers such classrooms generate, the department has built a new classroom dedicated to Active Learning. There are no rows of desks, but rather tables that can easily be moved to form pods of students working collaboratively. There isn't a front to the room, there are projectors aimed at all of the walls, and there is space for students to move about and collaborate with their colleagues. Perhaps the most important aspect of our new Active Learning classroom is this flexibility. It can be rearranged in a matter of seconds and all of the walls are whiteboards, again facilitating collaborative work. This flexibility is crucial as there is no one single model for Active Learning. Adapting our curriculum to incorporate more Active Learning is hard work, but it is worth it when our students are better prepared for their futures. With our new classroom, we have overcome one of the largest obstacles to reaching that goal.

-Professor Kevin P. Furlong



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