

Department of Geosciences



The Boulder RUNdown - AY 2006/2007

By the numbers...

We now have 28 Geoscience majors...

14 in Geology,
13 in Environmental Geoscience,
and 1 in Earth Science.

Location, Location, Location...

The Department recently purchased a number of Garmin GPS units to use in various courses (e.g., Earth & the Environment, Map Interpretation, and Intro to GIS).

Rocks-R-Us...

Geoscience students have had a wide range of field opportunities this past year, including: Bancroft, Canada; Baraboo, WI; New Zealand (WT) and Appalachian Mts., MD-WV.

Contact Us!

Visit our revised website at:

<http://www.depauw.edu/acad/geosciences/>

F. Michael and Dorothy W. Wahl Endowed Fund for Geosciences Field Trips Established

The newly established F. Michael and Dorothy W. Wahl Endowed Fund for Geosciences Field Trips defrays student expenses for Geoscience field trips.

A long-held goal of the Department of Geosciences of establishing an endowed field trip fund to support Departmental field endeavors has now become a reality, thanks to F. Michael Wahl ('53). On behalf of him and his wife, Dr. Wahl generously donated a significant sum of money to create the field trip fund. Income from this fund will be used to minimize the remaining costs for Departmental majors participating on Departmental field trips (including those associated with Winter Term off-campus experiences). In establishing this fund, Dr. Wahl hoped that it might serve as a catalyst for like-minded Departmental alumni who want to help the Department offer additional significant field opportunities.



WT students on a hike to Mt Ngauruhoe in New Zealand.



Mineralogy students looking at marble-hosted detachment in Grenville-age rocks in Bancroft, Canada.

The Department of Geosciences continues the long-standing Departmental tradition of offering extensive field opportunities for our Geoscience majors. In fact, the Department offers at least one major field trip outside the Midwest each year in addition to the many regional and local field trips to geologic exposures throughout the Midwest. The Department subsidizes the cost of the field trips using travel funds allocated in our annual operating budget, which the Administration has increased in recent years because of the increased number of majors and increased travel costs. The Wahl Endowed Fund for Geosciences Field Trips will help alleviate some of the remaining expenses that are normally passed on to the students. Billy Alward ('08) is very grateful for the Wahl's generosity, "The hands-on experience on field trips really starts to make things that we've learned in the classroom click. It would be difficult for me to go on field trips without the financial support from the Department and its alumni."

MESSAGE FROM THE CHAIR

Greetings from Greencastle! Wow, how time flies...it seems like only a short time ago since our last newsletter. Even though the time has passed quickly, many significant events have happened in the Department. Most notably, through the generosity of F. Michael Wahl ('53), the Department now has an endowed field trip fund to help defray student costs for participating on Geoscience field trips. We are very grateful for this support!

Speaking of field trips, we continue to offer a diverse array of field opportunities for our students. You'll see many photos throughout the newsletter showing some of the geo-highlights from last January's WT to New Zealand (led by Tim Cope and Jeane Pope). Jeane just returned from co-leading a WT trip to Hawaii during January, and Fred and I hope to persuade the WT office to allow us to offer a May 2008 WT trip to the Colorado River Corridor in Utah, including a whitewater raft trip from Moab, UT to Hite, UT and an overnight hike to the bottom of the Grand Canyon, staying overnight at Phantom Ranch. Several of our majors in my Geologic Field Experiences class visited parts of this area last Spring Break, where they focused on mapping projects in the Henry Mountains and the San Rafael Swell. Other field trips included Jim's trip to Bancroft, Canada, our regular pilgrimage to Baraboo, WI, etc.



Geologic Field Experiences class at Delicate Arch near Moab, UT.

On a personal note, I published a manuscript this year on recent detachment fold research in the *Journal of Structural Geology* (with co-authors Sara Smaltz ('06) and Dannena Bowman ('05)). Funds from the Madison Fund helped cover some of the color page charges. I've also wrapped up my Faculty Fellowship project on 3-D stereo visualization of topographic landforms using Google Earth™ (check out my website <http://www.depauw.edu/acad/geosciences/mswilke/DELUGE.html> to see some of the results). I will be starting a new Faculty Fellowship next fall involving the incorporation of visualizations (specifically, animations) into two courses.

Beth and the boys are doing great. Zach is now 9 and Ben is 5...both are active in sports (basketball and soccer) and ready, willing, and able to go hiking at a moment's notice. Because they are both such Star Wars fans, it probably isn't surprising that they are presently very interested in the solar system and astronomy. Beth's work at DePauw's GIS Center keeps her busy as ever. She continues to work on various teaching and research projects, including one that currently is on display at the Children's Museum in Indianapolis. This Winter Term she also is teaching some faculty workshops on GIS (Geographic Information Systems) and will host a GIS workshop at DePauw in late May for the National Institute for Technology in Liberal Education (NITLE).

Please stop by if you're in Greencastle!

-Scott (mswilke@depauw.edu)

Department Awards/Scholarships

Ernest R. "Rock" Smith Memorial Scholarship

William S. Alward
Benjamin T. Clement
Benjamin A. Gibson
Phillip R. Mooney

H. Richard Gault Memorial Scholarship

Neil D. Farren
Nicholas Q. Vetz

Charles L. Bieber Memorial Fund

No one attended field camp.

Charles M. & Frances Wylie-Condit Science Scholarship

David P. Della Chiesa

James A. Madison Fund for Research

☉ Funded partial page charges for a manuscript publication (Wilkerson).



Geologic Field Experiences students sketching the Virgin Anticline in Utah.



Structure class measuring strike & dip in a Baraboo, WI quarry.

Jeane Pope

Hi All! 2006 has turned out to be another busy year! It all started with a WT in New Zealand with Tim Cope and 23 students (mostly Geoscience majors). Now, before you start feeling too jealous, let me tell you that it wasn't all peaches. After being delayed 24 hours (and two virtually sleepless nights), we arrived, but not all of our luggage did. After dealing with all that, we marched out to our "vans", only to discover that they were small Mack trucks (see photo). So, I found myself driving stick for about the third time ever, on the wrong side of the road, on no sleep. The videos are humorous, but we survived. And, of course, New Zealand was glorious! Volcanic islands, calderas, glaciers...not to mention other cool things like Kiwi (birds, fruit, and people), Maori, and huge stretches of undeveloped land. Perhaps my favorite part was the raw, cobble-strewn beaches of South Island. It's a place to which I most definitely want to return.

The spring semester was a whirlwind with Geochemistry, Environmental Science Seminar, and Environmental Geology, and therefore, it passed in a flash. During the summer, I worked with John Pogue ('07) and Nick Vetz ('08) at the Green Valley abandoned mine near Terre Haute. We started a new direction of research investigating the ground water – surface water interaction of the hyporheic zone, which was presented at GSA in October (please see page 4 for more details). This is likely to be a fruitful area of research for the foreseeable future.

This semester I'm teaching a new first year seminar entitled "Modern Environmental Problems," Earth & the Environment (aka Physical Geology) and coordinating the Women in Science program. All of these activities have been very rewarding. It's been fun to work with students that are just getting excited about Geology. I also still manage to keep tabs on the majors through advising and other conversations.

2007 looks to be just as exciting. I just returned from co-leading a Winter Term trip to Hawaii with Dr. Janet Vaglia (Biology) and 21 students. We explored the geo-biology of Hawaii (the Big Island) and Kauai for 18 days (I'll include photos in the next newsletter). In the spring semester, I'll be teaching Hydrogeology and Physical Geography. No rest for the wicked!

On a personal note, Jason and I celebrated our two-year anniversary this fall. He is still working for the USGS at the Greencastle outpost of the Virginia Water Science Center. Huan, our three and a half year old pup, keeps him company during the day. I continue to run and swim for exercise and fun, although a nasty combo of strep and sinus infection has temporarily slowed me down. But, with the 2007 Mini-Marathon as a goal, I'm sure I'll be back into it in no time. It's been lovely to see/hear from many of you during the last year. Keep the emails and visits up over the next year!

-Jeane (jpope@depauw.edu)



DePauw WT students studying geology in New Zealand.

F A C U L T Y N E W S



Mineralogy students studying 1.1 billion-year-old pillow lavas in Bancroft, Canada.

Jim Mills

Hard to believe it has been another year! This past year I have focused primarily on teaching classes and surviving committee work. I have added a laboratory component to the Earthquakes & Volcanoes course that was made possible by a Faculty Fellowship grant. The first run of the laboratory-based course went well, although there are many lecture and lab areas I want to further polish. The two highlights of the year were a nine-day trip to Iceland (done in conjunction with the Geological Society of America and partly funded by my Faculty Fellowship) and taking Mineralogy to Bancroft, Ontario. The Iceland trip was pure heaven for a volcanologist. I strongly recommend that if you ever get a chance to go there – just do it. To be able to stand on an active spreading center and to see some of the world's most famous and notorious volcanoes is amazing (the hot springs are pretty nice too...). The Bancroft trip was wonderful in spite of several days of cloudy, drizzly weather. The students got to see minerals from their lab boxes in their natural habitat. We had a wonderful time, and I am planning on taking this year's Mineralogy class back in October. Best wishes to you all for 2007!

-Jim (jmills@depauw.edu)

Research on Acid Mine Drainage

During Summer 2006, John Pogue ('07) and Nick Vetz ('08) continued Dr. Jeane Pope's work on the abandoned Green Valley Coal Mine, located NW of Terre Haute, IN, which has been contributing to the poor water quality of the adjacent West Little Sugar Creek for over half a century. Most notably, water samples from the creek were found to have both low values of pH and high iron concentrations as a result of runoff from the mine, despite reclamation efforts by the Indiana Department of Natural Resources.



John Pogue ('07) looks upstream at an acidic seep.

The goal of this project was to determine the relative contributions and controls on ground water and surface water to West Little Sugar Creek. Ground water was investigated through the installation of mini-piezometers to various depths at transects upstream and downstream of the points of confluence of surface channels from the site. Water levels were monitored during varying weather conditions to see how the ground-water flow differed between periods of heavy rain and periods of little to no precipitation. Water samples were collected from these wells and then analyzed using atomic adsorption and ion chromatography.

The pH of water upstream of the site was commonly 8.2, and the pH of water of a surface spring was as low as 3.2. The pH of the stream generally decreased downstream unevenly, whereas the pH of the water in the piezometers varied on the order of several pH units, but was generally less than the adjacent stream water. Elevated levels of iron and aluminum were found in the wells. When ground water discharges into an oxygenating environment, these metals form various hydroxide complexes. Consequently, the majority of the



Mini-piezometers installed to investigate shallow groundwater in an acid mine drainage creek.

stream bed located along the coal mine site is encrusted with a thick layer of orange to red ferricrete. As we predicted, increased ground-water flow increased during major precipitation events. A few differences in hydraulic head also were recognized in downstream wells, which indicates that ground water and surface water exchange is occurring. Furthermore, this contamination has a negative effect on the nearby environment and community.

2006 GSA Annual Meeting

Five Geoscience majors traveled to Philadelphia in October to the annual meeting of the Geological Society of America. John Pogue ('07) and Nick Vetz ('08) presented the results of their summer research with Dr. Pope in a poster entitled "Ground Water - Surface Water Exchange in an Acid Mine Drainage Setting." Dr. Pope and Phil Mooney ('07) presented a poster describing methods of incorporating research into the curriculum that was entitled "Integrating Research into an



DePauw contingent at the 2006 Boston GSA meeting.

Undergraduate Geochemistry Course." In addition, Charlotte Buehler ('08) and Lauren Weir ('08) attended the meeting to visit with graduate schools and to learn more about research in the geosciences.

Tim Cope

Hello everyone! A lot has happened since last year. I began 2006 by co-leading a field trip to New Zealand for winter term (with Jeane Pope). I had run this trip once before as a graduate student at Stanford, and although we followed a similar itinerary this time around, I added a few destinations that were new to me in order to keep things interesting. After a somewhat shaky start (see Jeane's description), the trip was spectacular! I think that the highlight for most of the students and me was a boat ride to White Island, an active volcano off the northeast coast of North Island. We were so close to active fumaroles that we were required to wear gas masks and hard hats (see the photo on Page 5). We were extremely fortunate to have fantastic weather, even during our cruise of Milford Sound, one of the rainiest places on Earth. A resident of the Sound told me that the day of our visit was the first sunny day there in several months! I will definitely be running this trip again, as our new majors are clamoring for it.

During the Spring semester I submitted a grant proposal to fund research in eastern Tibet. Although this proposal was



WT students studying sulfur deposits in New Zealand.

ultimately not funded, I was able to use matching funds from DePauw to conduct a Summer 2006 research expedition to China with student Alex Breitingner ('09). Our goal was to collect and document paleosol samples for oxygen isotope paleo-elevation analysis from sedimentary basins of Mesozoic-Paleogene age, in order to determine whether this part of the plateau attained its present elevation during this time span. We spent 2 weeks in Yunnan Province and 2 weeks in Tibet proper, followed by 1 week off in Beijing and 4 weeks in north-central China working with a group of researchers and students from IU and Louisiana State University. It was a very long field season, and much of the Tibetan portion of it was spent working at elevations >4000 m during the height of the monsoon season. Unfortunately, weather and several problems with the local authorities (who disputed the validity of our travel permits) forced us to abandon much of our planned work too early, and we were only able to sample a few of our planned localities. The second half of our summer, in north-central China, turned out much better, and I now have enough data for a grant proposal for future work in this region. I plan to submit a proposal to NSF in June. Since 2006, I have submitted two papers for publication. One is now in press (Geological Society of London Special Publication 280), and the other is in review for Basin Research.

I have been on leave for the Fall semester, and have remained in Greencastle to work on new labs for our Earth & the Environment and GIS courses. Much of this work involves the incorporation of Google Earth™ into the curriculum as a visualization tool with the creation of Google Earth™ datasets that illustrate specific geologic features. I have created several new labs for our introductory students that use these datasets, and I will be "test-driving" these exercises during Spring 2007. Some of these visualizations are quite amazing. The one I am most proud of is a global tectonics visualization that shows seafloor ages, topography, bathymetry, active volcanoes, and earthquakes (classified by depth) for the entire globe in 3-D. Students will use these data to construct a map of global tectonics. Please contact me if you'd like a copy!

I've passed several milestones in my personal life this year as well. Last June, my (then) girlfriend Kate Knaul and I bought our dream home just outside of town. Being originally from California (where homeownership was always out of reach to me), I am really excited about owning my first home! Indiana does have its advantages... In addition, my then-girlfriend is now my fiancée – we will be married in August. She is Director of International Education and Off-Campus Study at DePauw, so among other things we both have the international travel bug in common.

Next time you visit DePauw, please stop in and say hi!

-Tim (tcupe@depauw.edu)

Fred Soster

This past year has been a relatively quiet one for me (and that's good). I finished my three-year Faculty Fellowship project that involved converting most of my courses to electronic format (PowerPoint™). The students can now download the presentations from the University computer network and annotate the slides during lecture. I resumed full-time teaching last spring after having many years of release time for administrative and research endeavors. I did manage to complete a manuscript on the research I did in Yellowstone National Park, and it has been accepted for publication in the journal *Earth Surface Processes and Landforms* (I just finished the revisions during this Winter Term). Last summer I continued working with colleagues from Case Western Reserve University, Niagara University, and the United States Geological Survey on the hypoxia problem in Lake Erie. We did a laboratory study that examined the effects of mayflies on oxygen content in water. We used oxygen microelectrodes and a hot wire anemometer (to measure flow velocity in the critters' burrows). We obtained some pretty neat results. The mayflies construct deep U-shaped burrows in the sediment, and as they pump water through the burrows, oxygen is consumed by the anoxic sediments. The water exiting the burrows has a considerably lower oxygen concentration than when it enters the burrows. So it appears that mayflies are partly to blame for the hypoxia problem. We are presenting these results in May at the International Association for Great Lakes Research conference at Penn State. We also plan to do more work on this problem this summer.

My kids are really growing up. Erica turned 16, started driving last summer, and held down her first job as a lifeguard at the city pool. She is a junior and we are starting to look at colleges! Frederick turned 11 and started middle school. He has turned into an armchair historian and is fascinated by all aspects of WW II. He also claims that he is too old for daycare! Please let us know if you plan on coming back for this year's reunion weekend in June. Jennifer, who is the Director of Alumni Relations, is already busy attending to the details. I usually attend many of the events in the role of Director's spouse, so I'll be around and would like to see some of you. Have a good 2007 and please keep in touch!

-Fred (fsoster@depauw.edu)



Fred working with students at an intrusive contact on the south flank of Mt. Hillers, Henry Mountains, UT.