



DEPARTMENT OF GEOSCIENCES

BOLIVIA MADISON AND POSTER 1892

BOULDER RUNDOWN

Fall 2004 Newsletter

Message from the Chair

Greetings from Greencastle! We've been looking forward to an opportunity to update you all on departmental happenings. Thanks to **Jim Mills** for making this newsletter happen!

As you may have noticed, the department has changed its name to the "Department of Geosciences". This reflects our broadened offerings in geology, earth science, environmental geoscience, and geography better than our previous title. Recent curricular changes in the department also have shifted our emphasis away from geography towards environmental geoscience. However, we still have a geography minor and **Tim Cope** is offering our first GIS course this fall. We've also spent considerable time revising major requirements and renumbering our courses for better sequencing... all to attract students to our majors and to ensure that they are properly prepared for graduate school and the 'real world'.

The department continues to offer numerous field opportunities for the students. For example, last spring a large group from our Field Experiences and Sed/Strat courses traveled to Utah. There they spent several days mapping, measuring sections, describing rocks, etc. This would not have been possible if it hadn't been for the Administration providing significant financial support to defray the costs. As we prepared our budget for the 2004-2005 academic year, we considered establishing an

endowed Departmental Field Trip fund to help defray field trip expenses (where our needs are most critical). The Administration, however, recognized the importance of fieldwork in the geosciences and has substantially increased our departmental budget to help cover costs. How does this impact you? Through your donations, our Departmental Scholarship Funds (Smith, Bieber, & Gault) have maintained balances to adequately address our student scholarship needs. Should you be considering a donation to the Department, please consider directing your donation to the DePauw Annual Fund (in lieu of an endowed Departmental Field Trip fund) or to the departmental Jim Madison Fund. We sincerely appreciate your support!

Lastly, we would really like to continue the tradition of including alumni information (e.g., family updates, employment changes, contact information, other news, etc.) in the newsletter. Please send us an update on yourself! Send your information to our secretary, **Bonnie Bryan**, at bbryan@depauw.edu, 765-658-4654, DePauw University, Department of Geosciences, 602 South College Avenue, Greencastle, IN 46135.

Cheers,
Scott

Note: Bold names represent Dept. of Geosciences faculty, staff, and students.

FACULTY UPDATE

Tim Cope

My first year at DePauw has gone wonderfully. I am thrilled to be a part of this department! My teaching responsibilities this term include a new course in Geographic Information Systems (GIS) and GPS mapping. We are utilizing a fantastic computer lab in Julian for this course. The lab is fully equipped with 30 Dell Optiplex PC workstations loaded with ArcView, the industry-standard GIS software. Students can thus interactively learn GIS techniques and "follow along" as I show them how to perform tasks with the software. In addition to the GIS course, I am teaching Physical Geology and will teach Field Experiences (Death Valley) in the Spring. This winter term, I will be taking students on a field trip to California, where we will visit the San Andreas fault, Yosemite Valley, and Death Valley.

In addition to my teaching responsibilities, I have also been active in research. Last spring I was awarded a Freeman faculty scholarship, a Faculty Development student-faculty research grant, and a Professional Development Fund grant for summer research. Last June, I took **Audrey Gehlhausen** ('06) to northeastern China for 35 days of fieldwork, followed by a month in California to perform mineral separations and SEM analyses at Stanford University. We are currently preparing for the GSA annual meeting, where Audrey will present the results of our fieldwork in the general Structure and Tectonics poster session.

I also took a bit of time off this summer to go backpacking in the Sierra Nevada and the Wind River Range of Wyoming. I ended the summer with a trip to Florence, Italy where I presented some of my older China research at the International Geological Congress. (Some advice: if you ever get an opportunity to go to Italy, DO IT!)

Jeanette Jerz

Hello All! Academic Year 2003-04 contained some big changes for me, both professionally and personally. It was my second year on the faculty at DePauw, and I developed *more* new classes to support the Environmental Geoscience Major, including Environmental Geology and Applied Hydrogeology. I also continued work on an acid mine drainage (AMD) site near Terre Haute, Indiana, which included supervising an independent research project with **Erica Amt** ('04). Throughout the year, Erica investigated the sediments from West Little Sugar Creek, which is impacted by AMD. Last spring, Erica was the first graduate with a B.A. in Environmental Geoscience. We are pleased and excited that she will be joined by many others in the upcoming years who also have chosen to pursue this major.

Hot Spots

Number of Majors

Geology	9
Env. Geoscience	6
Earth Science	0

Recent Field Trips

Las Vegas, NV
Bancroft, Canada
Moab, UT
Baraboo, WI
Hawaiian Islands
St. Francois Mts., MO
Kentland Impact Site, IN
Mammoth Cave, KY
NE China

Departmental Funds

- **E.R. "Rock" Smith Award**-scholarship given to reward academic excellence by departmental majors.
- **E.H. Richard Gault Award**-scholarship given to outstanding departmental majors.
- **Wylie-Condit Science Scholarship**-scholarship given to upper-class students to further their studies in the fields of science & mathematics.
- **C. L. Bieber Scholarship Fund**-scholarship given to students who plan on attending a summer field camp
- **James A. Madison Fund**-fund to support geoscience-related student-faculty research.

2004 Department Awardees

Sara Baughman (3)	\$2,000	<i>Smith</i>
Phil Mooney (1)	\$ 500	<i>Smith</i>
Sara Smaltz (2)	\$2,000	<i>Smith</i>
Audrey Gehlhausen (2)	\$2,000	<i>Smith</i>
Mark Loomis (2)	\$1,000	<i>Gault</i>
Keith Herrmann (3)	\$1,000	<i>Gault</i>
Kathryn Adank (3)	\$1,000	<i>Gault</i>
Troy Wyss (3)	\$1,000	<i>Wylie-Condit</i>

(1) Freshman (2) Sophomore (3) Junior

World-Wide Web Page

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

E-Mail Addresses

Cope	tcope@depauw.edu
Jerz	jjerz@depauw.edu
Mills	jmills@depauw.edu
Bryan	bbryan@depauw.edu
Soster	fsoster@depauw.edu
Wilkerson	mwilke@depauw.edu

*Please take some time and let us know about what is going on in your life. In future newsletters, we would like to include an **Alumni News** section as in past newsletters so as to keep everyone in touch with each other (and with us!).*

Jeanette Jerz, continued.

In other professional news, I am pleased to announce that last fall the department purchased a Dionex ICS-2000 Ion Chromatography System with funds secured by a grant that I received from the National Science Foundation. This instrument will help strengthen our environmental offerings by allowing us to perform many types of water analyses for classes and research projects. Together with students, I have been working on installing and calibrating the IC and it will be used this fall in the Geochemistry class.

On a more personal note, I am excited to say that my several years of collaboration with Jason Pope, a hydrogeologist from the USGS, has led to a very fruitful partnership – we're getting married this fall! Jason will be moving to Greencastle in October. To prepare for his arrival and our future together, we bought a house on Washington Street. Our new house was the site of the "End of the Summer GeoBash" and it will hopefully see many other happy celebrations in the future, perhaps even with some of you! I have enjoyed meeting several of our alums in the last two years, and I look forward to getting to know even more. Wishing joy and peace to all.

Jim Mills

Greetings! It is hard to believe another year has gone by. This year I was awarded a Faculty Fellowship Grant to completely revise the Earthquakes and Volcanoes course. The new course will be technologically updated and will have a semester-long laboratory. This project is part of what the department hopes will be a long-term overhaul of our General Education courses.

My research in Bancroft continues to move along steadily. **Katy Adank** ('05) and **Chris Myrvold** ('06) both assisted me last summer and during the school year on various aspects of the project including more electron microprobe work at IUPUI. In 2005, Chris and I hope to return to Bancroft to tie up some loose ends. To help out, Erik Melchiorre, a former instructor in the Department, was able to obtain a supplemental grant from the Petroleum Research Fund of the American Chemical Society to train students and me how to perform stable isotope analyses at his laboratory at Cal State University, San Bernardino. Next summer, Chris and I will use the lab for carbonate analyses. This past summer (2004) Brett McArthur (a first-year SRF student) and I traveled to San Bernardino to perform isotope analyses on waters from the Big Walnut Creek aquifer. My highlight for the summer, however, was getting to tour the Mountain Pass Carbonatite Mine in southeastern California courtesy of Erik! Rare earth elements everywhere! Nothing better than igneous calcite – not a dead bug anywhere to be seen...

Deb is doing great at the DNR and is now a mid-continent manager for one of the big projects. She gets to travel quite a bit and is enjoying it all...

Fred Soster

Hello everybody! I've been on leave this calendar year and have spent most of the time analyzing our data from the Yellowstone project and writing up the results. **Keith Herrmann** ('05), who worked with me on Lake Erie last year, presented results of that work at the Annual Meeting of the International Association for Great Lakes Research in May. This past summer, three students (Erin Yoder ('07), **Phil Mooney** ('07), and **Mark Loomis** ('06)) worked with me examining heavy metals in Lake Erie sediments. The good news (especially if you like to eat Great Lakes fish) is that concentrations are coming down and it looks like the timing coincides with passage of pollution laws in the early 1970s.

The family is doing fine. Erica is now 14 and has started high school. Frederick is 9 and is playing his first season of tackle football. The big news is that Jennifer was recently appointed the Director of Alumni Relations for the University, so you will probably be hearing from her during the next year. Please stop by to see us when you are in the vicinity and feel free to call ahead of time to let us know you plan to visit.

Scott Wilkerson

This year seems to have flown by! My sons, now 7 (Zach) and 2.5 (Ben), are a constant source of amazement (and amusement). Both are still rock hounds and are determined to fill Bowman Pond with the pebbles that they toss in (it is now a regular routine for Beth to extract rocks from their pockets before she washes their clothes). Beth now splits her time as a part-time web/database programmer for the CGMA (Collaboratory for GIS in Mediterranean Archaeology) archaeology project here at DePauw and as a GIS specialist who provides support for faculty interested in using GIS. While I had the great fortune to lead a field trip to Utah over Spring Break, these guys all had to stay home. We made up for that this summer, however, as we took a family vacation to Rocky Mountain National Park in Colorado...what a neat place!

Last year I continued to teach a range of courses including Environmental Geophysics, Geologic Field Experiences, and Geology of America's National Parks. These courses, coupled with my Faculty Fellowship on Virtual Landforms, kept me busy. Research has been going great as well. This summer I worked with **Sara Smaltz** ('06), continuing our research on detachment folds. **Sara's** work has progressed very well, and she will present her results this fall at the Denver GSA annual meeting. If you attend, please stop by and see us. Take care and keep in touch!



Dr. William (Bill) Fetter ('64, chemistry) visited campus in late April to make a presentation for the department. Above, students and faculty discuss environmental consulting with Dr. Fetter.

Recent Department Publications

Cope, T.D., Shultz, M. R., Sun Weihua, and Graham, S. A., in review, Mesozoic syntectonic sedimentary development of the Yanshan fold-thrust belt, NE China: constraints on thrust timing and geometry, *GSA Bulletin*.

Cope, T.D., Ritts, B. D., Darby, B. J., and Graham, S. A., in press, Late Paleozoic sedimentation on the northern margin of the North China block: implications for regional tectonics and climate change, *International Geology Review*.

Melchiorre, E.B., Mills, J.G., Jr., Dale, D., and Chapman, B. in review, A new occurrence of Xititeshaite ($\text{Fe}^{3+}(\text{SO}_4)\text{Cl} \cdot 6\text{H}_2\text{O}$) crystals in acid-mine seepways, Green Valley, Vigo County, Indiana, U.S.A., *American Mineralogist*.

Jerz, J.K., and Rimstidt, J.D., 2004, Pyrite oxidation in moist air, *Geochemica et Cosmochimica Acta*, v. 68 (4): pp. 701-714.

Jerz J.K., and Rimstidt J.D., 2003, Efflorescent iron sulfate minerals: Paragenesis, relative stability, and environmental impact, *American Mineralogist*, v. 88 (11-12): pp. 1919-1932.

Whiting, P.J., Matisoff, G., Fornes, W., and Soster, F.M. in press, Suspended sediment sources and transport distances in the Yellowstone River Basin, *GSA Bulletin*.

Wilkerson, M.S., Wilson, J.M., Poblet, J., and Fischer, M.P. in press, DETACH: an Excel spreadsheet to simulate 2-D cross sections of detachment folds, *Computers & Geosciences*.

Apotria, T.G. and Wilkerson, M.S. in press, Rosario field, Maracaibo Basin, Venezuela: Shaw, J.H., Connors, C., and Suppe, J. (ed.), Seismic interpretation of contractional fault-related folds, *AAPG Seismic Atlas*.

Marshak, S., and Wilkerson, M.S., 2004, Fold-thrust belts—an essay: van der Pluijm, B.A. and Marshak, S., (ed.), *Earth Structure*: Norton Publishers, 2nd ed., Ch 18: pp. 444-474.

Departmental Facilities

Organization of the new rock room is finally complete! All of the equipment is in place and the rock drawers are finally back in the shelves. Over the last year, **Jeanette** and **Fred** have had students ro-tapping sediments, and the petrology students were making thin sections. Even better - the flume is also now back in action. **Tim** had **Troy Wyss** ('05) and **Chris Will** ('05) doing bedform studies as part of a Sedimentology class project. The Macintosh lab has been completely upgraded to Mac G-5's – not only are they super-fast, but they look great too!

The DePauw Nature Park, nearly 500 acres in size and located within a mile of Blackstock Stadium, is now open for student, faculty, staff and community use. This semester we have a Science Research Fellows group working on the stratigraphy and paleo-ocean thermometry of the limestone in the quarry. A new classroom facility is currently in the planning stages for the Nature Park and should be finished by next fall. The classroom will provide faculty and students with space necessary to work on projects in the Nature Park without having to bring materials back to campus. Dr. Wade Hazel of the Biology Department has been coordinating the various academic uses of the Nature Park.

Jeanette has continued to study the environmental impact of acid mine drainage from a partially reclaimed coal refuse pile on a local creek. Last November, **Erica Amt** ('04) and Christina Houston ('05) presented the results from the previous summer of research at the Geological Society of America national meeting in Seattle. **Erica** also presented the results of her independent study project at the meeting of the National Council of Undergraduate Research in April.

During the summer of 2004, **Jeanette** was assisted by Kelly Fransted ('07) and Laura Stevens ('07) from the SRF program. Kelly developed a protocol to analyze water samples from the mine site and from the nearby creek using the new ion chromatograph. Her efforts allow for a much more detailed analysis of the chemistry of these waters. In addition, they may contribute to a better understanding of how the acidic waters move through the site, despite reclamation efforts. Laura used a GIS (geographic information system) to develop an interactive map and database that will contribute to temporal and spatial analysis of the site. Due to her interest in biology, Laura also measured and mapped many plots of trees on the site to determine how AMD impacts the vegetation. Both of these studies provide important groundwork from which future research will grow.

Tim continued his work in mainland China this summer with **Audrey Gelhausen** ('06). Their project involved fieldwork for two separate projects. First, they collected samples for $^{40}\text{Ar}/^{39}\text{Ar}$ dating from two caldera complexes that may have been responsible for mass-mortality events evidenced by highly fossiliferous stratigraphic intervals found throughout Liaoning Province. These bird fossil localities are well-known for yielding numerous well-preserved species of "feathered-dinosaurs" said to be the missing evolutionary link between dinosaurs and birds. **Tim** and **Audrey** intend to date the samples to see if the calderas and fossils are age-equivalent. Second, they mapped in a major Mesozoic thrust belt north of Beijing to determine the kinematic history and offset of the Chengde thrust. Over the remainder of the summer, **Tim** and **Audrey** processed rock samples using the mineral separations lab at Stanford University. Four samples yielded significant populations of zircon that will be dated using the Sensitive High Resolution Ion Microprobe (SHRIMP) at Stanford next spring.

Fred spent the summer working with Erin Yoder ('07), **Mark Loomis** ('06) and **Phil Mooney** ('07) on sedimentation in Lake Erie. **Fred** and his students spent the summer analyzing sediment cores from Lake Erie for metal concentration variation over time. The goal of this project is to identify if and how Environmental Protection Agency legislation enacted in the 1970's has had an effect on metals contamination of Lake Erie. The results of their work indicate that the concentration of metals appears to be decreasing with time. The group also began a new study on the effect of mayfly larvae on sediment oxygen demand, which in turn may affect sediment nutrient absorption rates.

Scott worked with **Sara Smaltz** ('06) through the SRF program this past summer. Their research continued work on the 2-D & 3-D modeling of detachment folds that was presented last year at GSA by **Sara** and **Dannena Bowman** ('05). **Sara** created programs to simulate the 2-D geometry of various types of detachment fold models. She then used Geosec™ cross-section modeling software and Gocad™ 3-D modeling software to create a library of 3-D detachment fold terminations by linking serial cross sections along strike assuming an along-strike decrease in displacement (decreasing to 0 at the termination). Her results capture the variability in 3-D geometries of the different models and provide a useful tool for interpreting the geometries and kinematics of under-constrained folds. **Sara** will present her work as a poster at the annual GSA meeting in Denver this November.

Jim shifted gears this summer and worked on the hydrogeology of the Big Walnut Creek aquifer with Brett McArthur ('07). Data collected over the last few years has been used to suggest that recharge of the aquifer occurs primarily when Big Walnut Creek floods as opposed to the commonly accepted paradigm of stream bed infiltration. Data collected over the summer and from previous years clearly shows the flood/recharge relationship. This study is being utilized by the city of Greencastle to better plan long term water usage.

Tim and **Scott** will be traveling to Denver, Colorado with their students this November to present the results of their research at the national meeting of the Geological Society of America.

The Student Body

The Department is growing rapidly! There are now 15 majors between the Geology, Environmental Geoscience and Earth Science majors. Add to that a significant number of students that are attempting to minor in one of the above areas and you can see that we'll soon need room for expansion... Our student 'offices' are now filled to capacity and we have a waiting list of sophomore's itching to get a space. We are averaging equal numbers of men and women in the program.

Student Accomplishments

Not only have the faculty had a busy year, so have the students. **Erica Amt** ('04) graduated this year with a major in Environmental Geoscience. **Erica** is the first major to complete this program, and spent the summer weighing her graduate school and employment options. She is now working for EnviroCorp in Indianapolis. Way to go **Erica**!

Audrey Gelhausen ('06) accompanied **Tim Cope** to China this summer to help with his research there. **Audrey** was already a world-traveler and can now add one more major country to her list. If you start seeing Chinese citizens with dreadlocks, you'll know who started it!

Sara Smaltz ('06) applied for and received a Goldwater Scholarship (\$7500/year). This scholarship normally is awarded to engineering and science students for their last year of undergraduate study. **Sara**, however, was awarded the scholarship for both her junior and senior years. She is one of six undergraduate students in the state of Indiana (and the first from DePauw!) to receive this award. If you need a superior 3-D fault-related fold modeler, you now know whom to call.

Dannena Bowman ('05) was accepted into a National Science Foundation Research Experience for Undergraduates (NSF-REU) program in Alaska. She worked with a team of graduate and undergraduate students in Alaska on a variety of petrology, structure and geophysics projects. Mosquitos have become **Dannena's** best friends.

Sara Baughman ('05) was accepted for the American Museum of Natural History's Summer Research for Undergraduates program. **Sara** worked on a project that is utilizing meteorites to unravel the origin of the solar system. Meteorites today, Mars tomorrow.

The Environmental Geoscience Major

The new Environmental Geoscience major has experienced a successful start. The department currently has six majors enrolled in the program and we had our first graduate this past year (**Erica Amt** '04). The major is based on a core of six geoscience courses, two upper level geoscience electives and a concentration of courses in two of three subdisciplines (chemistry, biology or economics). The major is popular with students because of the flexibility in the area of non-geoscience concentration. Current students are planning on careers in environmental policy and environmental consulting.

We were very fortunate this year to have **Dave Atteberry** ('99), Dr. William (Bill) Fetter ('64; chemistry) and Dr. Jill Springer of Buffalo State University come to DePauw to talk with students about careers in the environmental field – thanks **Dave**, **Bill** and **Jill**! If you are going to be in the area and would like to have a talk with the students – let us know.

Departmental Displays

As part of the Julian renovation and expansion project (for which **Fred** was the Project Shepherd), all of the departments in Julian sought to establish various departmental displays. The Department of Geosciences has contributed two significant displays to the building: a full-size, Tyrannosaurus Rex skull replica of 'Stan', and a museum-quality mineral and fossil display for the atrium of the building. Several other displays also have been erected.

Our new resident 'Stan' has been one of the main public eye-catchers since his arrival last summer. Stan is considered by paleontologists to be even better than 'Sue' because the skull was not crushed during burial. Stan is now housed in his new 'cage', a custom-built, cherry cabinet with specimen drawers in the base. We will be placing a number of tooth and claw replicas in these drawers that were graciously donated by **Jim Puckett** ('67; Thanks **Jim**!). We are hoping to use this display to lure-in future paleontologists!

Over two-dozen mineral and fossil specimens also were purchased over the last year from various dealers around the country. Our goal was to fill two large display cabinets at the base of the 'Grand Staircase' in the atrium. Fluorite, quartz and galena are the foundation of the mineral display, and Crawfordsville crinoids, ammonites, trilobites and mastadon and mammoth teeth form part of the fossil display (photos below).

An eight-foot by fifteen-foot tectonic map of the world produced and donated by Exxon Production Research has been mounted in the classroom hallway (courtesy of **Scott's** contacts at ExxonMobil). As you can well imagine, the map is used by many of our classes. The seismograph display also continues to be a favorite of the students as they go between classes.

The Chemistry Department now has a 'live' periodic table display. A six-foot by ten-foot replica of the periodic table contains samples of every element – both naturally occurring and man-made objects. A touch-screen monitor at the top of the display allows users to learn more about each element. In addition, this fall the Physics and Astronomy Department will have their new real-time solar telescope operational in the atrium. Visitors will be able to see live images of the sun in natural light and in H-alpha mode.

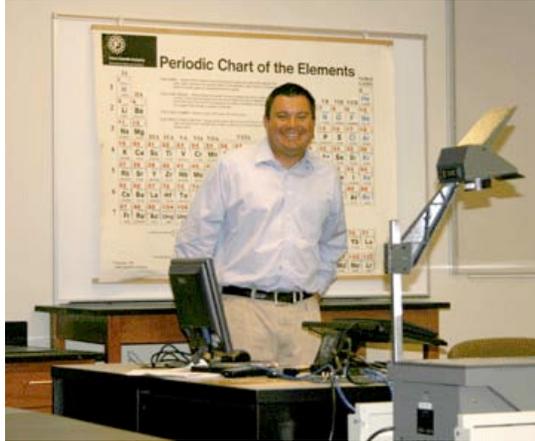
The next time you are in Greencastle – come check us out!



The Robert W. and Lynn Stang Browne Atrium is now home for Stan. Stan provides the extra little 'nip' to get students into the Prevo Library to study...



The display cases at the base of the Grand Staircase in the Browne Atrium are filled with museum-quality specimens of fossils and minerals.



Dave Atteberry ('99) of GeoSyntec Consultants in Jacksonville, FL visited the department to talk about the environmental consulting industry (including possible internships and ongoing remediation efforts for projects on which he has been working).



Audrey Gelhausen ('06) working in China with **Tim Cope**.



Mark Loomis ('06) and **Erin Yoder** ('07) collecting sediment samples on Lake Erie with **Fred**.



Students and faculty in the Geosciences Department. From left to right; Kneeling: **Heather Byars** ('06), **Sarah Smaltz** ('06). Middle row: **Jeanette Jerz**, **Allison Baccich** ('07), **Kyle Smitley** ('07), **Sara Baughman** ('05), **Dannena Bowman** ('05), **Mark Loomis** ('06), **Keith Herrmann** ('05), **Tim Cope**. Back row: **Fred Soster**, **Jim Mills**, **Katy Adank** ('05), **John Musselman** ('07), **Audrey Gelhausen** ('06), **Eric Rausch** ('06), **Troy Wyss** ('05), **Dustin Hertel** ('06), **Scott Wilkerson**. Not present: **Phil Mooney** ('07)



Jeanette in front of her new Ion Chromatograph for the Environmental Geochemistry lab.

Do you have a good photo you would like us to include in the next edition of the newsletter? Send it in! Photos in 'JPEG' format work best. Be sure to include the names of any persons, the class, and what year the photo was taken if at all possible.



***Suzanna (Carrithers) Roffe ('99)** on a field trip in Utah. Suzanna is currently working as the Water Quality Education Coordinator for the Dept. of Land Resources and Environmental Sciences at Montana State University. Suzanna notes that it's a little strange to be back in places where she has done fieldwork before...*

And speaking of Utah, here are a few pictures from the Utah field trip led by **Scott** and **Tim** for their Field Experiences and Sed/Strat classes.



***Katy Adank ('05)** doing a little strike and dip work...*



***Katy, Heather, Dannena, Sara, Ben and John** on the Waterpocket Fold, Capitol Reef NP.*



A spring hike on the 'fins' in Arches NP.



Mapping project at the San Rafael Swell.



The Spring 2004 Field Experiences and Sed/Strat classes posing under Delicate Arch, Arches National Park, Utah.