



DEPARTMENT OF
GEOSCIENCES

COLLEGE OF EARTH AND
MINERAL SCIENCES



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From the Department Head

Dear Alums:

What a difference a year makes! Last fall's financial crisis made its way to Happy Valley over the winter months, and, like all of higher education, the University has not been immune. Penn State's conservative financial practices have limited the pain; however, the department has still been forced to make cuts to educational and research programs. Our faculty, staff and students refuse to get down about potential bad news and continue to thrive. We continue to recruit large numbers of majors—over 130 at last count---due to our robust job market. And our faculty continue to develop exciting new educational ventures, to attract funding for their research, and to win prestigious awards (see pages 4-5).



The Marcellus Shale gas play described in last year's newsletter continues to attract dozens of oil and gas companies to Pennsylvania. Professors Terry Engelder, Mike Arthur and Rudy Slingerland have recently developed the Appalachian Basin Black Shale Group, a consortium to direct research on the Marcellus. The group has recently drilled three cores across the basin and it's exciting to see students hard at work on these spectacular materials (see page 12).

We have had some very sad news this year with the passing of Professor Peter Deines, a devoted member of our community for over 50 years. Peter was a truly outstanding faculty member in every way, from his commitment to high-quality teaching, his important research on the application of stable isotopes, and his vast array of service roles. Peter served on virtually every committee on campus at some point and was especially active on the faculty senate. He was dedicated to our graduate program, serving as Associate Head for eight years. In recognition of Peter's many contributions, we have set up the Peter Deines fund for graduate studies.

Forms of communication are changing rapidly, and, if you are like me, you have a hard time staying in touch with old friends and colleagues. The department would like to facilitate communication between our alums; thus we have set up a Facebook page at www.facebook.com (search for Penn State Geosciences, see page 17). Please check it out and "friend" us if you like.

I hope you enjoy this newsletter. Please keep the department and your fellow alums informed of your news via email (lisag@psu.edu or bralower@psu.edu) or on our Facebook page.

Yours best wishes for a happy and productive 2010,

Timothy Bralower

Cover photo: Professor Rudy Slingerland at Book Cliffs, Helper, Utah

Field Camp Summer 2009

Jesse Robertson, BS Geosciences



Group at Alta, Utah

Penn State Field Camp 2009: Seven weeks and 8100 miles, 26 men and three women, eight exercises and many firsts. For some, it was their first cross-country road trip. For others, sleeping in tents was new and exciting. For all, it was a time that we won't soon forget, a time spent with friends old and new, in some of the most beautiful spaces America has to offer.



Campfire at Wildhorse, Idaho

In a long tradition beginning in 1961, summer again saw Penn State's Geosciences students heading west. We investigated many meters of section at Utah's Book Cliffs, Quaternary landforms of Glacial Lake Bonneville, introductory mapping of Montana and

Wyoming's Elk Basin, Yellowstone and Grand Teton National Parks, Laramide structures expressed near Wildhorse, Idaho, and Sevier to recent structures of Little Cottonwood Canyon, neighboring Bell's Canyon, and Alta, Utah. Through it all, we struggled together and learned together. We observed, gathered data, formulated ideas, and drew conclusions. We practiced being competent geologists, and although we may have a long way to go, we fulfilled a necessary aspect of a Penn State Geosciences education – getting up close and personal with geology.

I formed many special bonds with my fellow field campers, something I feel my colleagues as well as alumni can echo about their respective experiences. We laughed, complained, celebrated, struggled, and grew as one united group of students with the same passion – understanding the Earth and its past. Over the time and the miles, we learned more about field geology, each other, and ourselves. I want to personally thank all those involved for making seven weeks and 8100 miles so enjoyable and memorable, including the professors, alumni, teaching assistants, and those students I can call my friends, those of Penn State Field Camp 2009: 26 men and three women.



Duff's Bench, Alta, Utah

Faculty & Alumni Awards

Professor Richard Alley 2009 Tyler Prize for Environmental Achievement



Professor Richard Alley has been selected to win the 2009 Tyler Prize for Environmental Achievement. The award, consisting of a \$200,000 cash prize and gold medals, was jointly awarded to Alley and V. Ramanathan from UCSD for

their work demonstrating the global reach and severity of human impacts on climate. The Tyler Prize Executive Committee and the international environmental community honored the recipients at a banquet and ceremony at the Four Seasons Hotel in Beverly Hills, California on April 24, 2009. Here is a section of the official press release:

"Alley is widely credited with showing that Earth has experienced abrupt climate change in the past, and likely will again. He based his work on a meticulous study of ice cores from Greenland and West Antarctica. Up to two miles thick, the ice sheets contain a unique record of Earth's climate history. Among climate scientists, he is recognized as an outstanding example of a superlative researcher who has found a way to balance his passion for discovery with his duty to inform nonscientists of the crises that are looming" geophysicist Garry Clarke of the University of British Columbia wrote in support of Alley's nomination. "His wonderful book 'The Two-Mile, Time Machine' (on the climate record from Greenland ice cores and its implications for humankind) combines good science with a serious message and succeeds equally with novices and experts." Ramanathan and Alley served as authors on the U.N. Intergovernmental Panel on Climate Change, whose members shared the 2007 Nobel Peace Prize with former Vice President Al Gore."

"The Tyler Prize for Environmental Achievement is one of the premier awards for environmental science, energy and environmental health. It was established by the late

John and Alice Tyler in 1973 and is awarded annually. To date, 59 individuals associated with world-class environmental accomplishments have received the prestigious prize."



Charles J. Ammon (l) and Dean William Easterling (r)

Professor Charles Ammon Wilson Award for Excellence in Research

Charles Ammon, Professor of Geosciences, was recognized for his high-profile seismological research. He is one of the world's preeminent seismologists working on the rupture processes of great earthquakes. Ammon's theoretical and applied research is both driving the seismologic research community in its improved understanding of how big earthquakes work and also providing the key tools needed by the U.S. Geological Survey and related organizations to improve their real-time response in determining the location, magnitude, extent, and potential damage from a major earthquake—in time for it to make a difference. The potential loss of life from great earthquakes is truly horrendous; thus, Ammon's research has enormous societal implications. Ammon's work on rupture has altered the way seismologists interpret large earthquake mechanics and greatly improved the accuracy and speed with which ground motion and tsunamis can be predicted. His work is being applied in early tsunami warning systems around the globe.

Faculty & Alumni Awards



Matt Fantle, Assistant Professor of Geosciences, was awarded the George H. Deike Jr. Research Grant for his project to determine the recrystallization rates of marine carbonates using strontium and calcium isotopes.

Laura Guertin, Associate Professor of Earth Sciences at Penn State Brandywine, has been selected to receive the prestigious GSA Biggs Earth Science Teaching Award. This GSA Geoscience Education Division's named award recognizes innovative and effective teaching of earth science among early career faculty. Laura is nationally known for innovation and effectiveness in education and this award is a major honor for her.



Jenn Macalady, Assistant Professor of Geosciences, won a Faculty Mentoring Award for superb graduate teaching and advising.

Kamini Singha, Assistant Professor of Geosciences, has received the 2009 Environmental and Engineering Geophysical Society's (EEGS) Early Career Award which acknowledges academic excellence in near-surface geophysics.



L-R Dean William Easterling; David Han, PSAA President; Sara Das; Graham Spanier, PSU President

Sarah B. Das, '03 Ph.D. Geosciences and assistant scientist at the Woods Hole Oceanographic Institute in Hull, Massachusetts, was honored for outstanding professional accomplishment and presented with the Penn State Alumni Association's Award on April 3, 2009. Das, a glaciologist in the Geology and Geophysics Department, has participated in 10 polar field expeditions. Her discoveries about the Greenland Ice Sheet are causing scientists to rethink important aspects of the future of the earth's coasts. Das led the fieldwork analysis and publication in the journal *Science* of the startling observation that lakes atop the Greenland Ice Sheet wedge open crevasses, triggering flood to the base of the ice and flows in excess of Niagara Falls. This causes floating and shifting of the ice sheets, potentially speeding its flow toward the coast to raise sea levels.

Alumni Achievement Award honorees have reached an extraordinary level of professional accomplishment, all by the age of 35 or younger. These prominent young alumni are nominated by an academic college or campus, selected by a University-wide committee and invited by President Spanier to return to campus to share their expertise with students and the University community. The Alumni Achievement Award began in 2005, and since then has honored 49 outstanding alumni.

Student Awards and Honors

Undergraduate Awards

The Barton P. Cahir Award Endowment in Earth and Mineral Sciences: Kevin Ward

The Benjamin F. Howell, Jr. Award in Geosciences: Sarah Barrett, Patrick Dooling, Jesse Robertson, and Alysa Young

The Frank Dachille Memorial Award in Geochemistry: James Ayer and Theodore Present

The James and Nancy Hedberg Scholarship in Geosciences: Abdul Haleem Arbi, Nurul Fatini Azizan, Richard Dabundo, Dylan Frey, Lauren Herwehe, Stamatina Hunter, Jacqueline Dougherty, Daniel Mills, Rosselly Mohd, Simret Singh, and Kevin Ward

The Joseph Berg Award for Undergraduate Research in Geosciences: Alexander Bryk and Laurie Eccles

The Robert F. Schmalz Award in the Department of Geosciences: Samuel Bydlon

The Scholarship from the Arthur P. Honess Memorial Fund: Rahman Abdul, Sarah Barrett, Dylan Frey, Brittany Grimm, Ahmad Ishak, Stephanie Taylor, Thomas Tornegard, Nathaniel Wysocki, Ahmad Yusofim, and Zharif Zulkifli

The Scholarship from the Ronald A. Landon Endowment in Hydrogeology: Nathan Barber and Michael Cronin

Twenty-seven students participating in the Summer 2009 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

ConocoPhillips MS Fellowship: Rebecca Boon

EMS Centennial Research Travel Award: Clay Magill

ExxonMobil Fellowship: LaMichelle Arnold

Funds for Excellence in Graduate Recruitment (FEGR) Assistantships: Lauren Milideo

Geosciences Graduate Student Colloquium Award: 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: Clay Magill and Maggie Popek

Scholten-Williams-Wright Scholarship in Field Geology: Alicia Cruz-Uribe and Becky McCauley

Shell Geosciences Energy Research Facilities Award: Heather Albrecht, LaMichelle Arnold, Reed Bracht, Colin Carney, Brett Carpenter, Aaron Diefendorf, Dan Jones, Bryan Kaproth, Enrique Perez, Andy Rathbun

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!

Meet the Undergraduate Students

Jennifer Kissell

It was in my Earth Science class at State College Area High School that I realized I was different from the slumped over students in the room with me. I was paying attention in class, asking questions, and reading the articles our teacher would give us about geology instead of tossing them in the bin. I even took the advanced geology class, which is practically unheard of considering most students don't understand why anyone would bother studying rocks. I was one of about eleven students in the class. Despite the lack of popularity, I absolutely adored the class and loved even more the idea of doing research in the subject. When I decided to go to Penn State I knew my major would be in Geosciences.

My parents doubted my decision at first. My father was puzzled and asked what exactly would one do with a Geosciences major. I told him that there were many options including volcanoes, earthquakes, or even ice sheets. Unfortunately this caused my mother to panic about the idea of me falling into a volcano, or freezing in the Arctic. Lucky for her I suppose, right now I'd rather work with fossils in the Deike Building. I am currently working with Peter Wilf on his project to tackle the challenge of identifying a plant based on its leaf. Next year I plan on going to South Dakota to cave in the Black Hills to excavate fossils, which my mother finds more palatable than me camping on an iceberg. While I am only a sophomore in Geosciences I am already excited about where my major will take me. Even if it means making my mother worry sick about me while I scale the side of a volcano.



Alysa Young



My name is Alysa Young and I am a senior undergraduate in the Geosciences department. I started off my college career at Penn State Erie, The Behrend College where I spent two years, largely uncertain of what field of science I wanted to pursue. I finally decided on my current major because I wanted to experience the field component that geosciences possess and ultimately, find a job that would allow for at least some time outside. This past summer at field camp only strengthened my affinity for the outdoors after six weeks out west studying geology, camping, hiking, etc. We spent time in Utah, Montana, and Wyoming and it was a fantastic, once-in-a-lifetime experience.

This is my third semester at UP and I am planning on graduating in December, 2009. Currently, I am fulfilling last-minute graduation requirements including working with Dr. Charles Ammon on my senior thesis which focuses on volcano seismology. After graduation, I plan on getting an internship during the spring semester and summer and then continuing on to graduate school in the fall of 2010. I am looking for grad schools out west since I am originally from Chardon, OH, and, after spending time in Pennsylvania for my undergraduate

degree, I am eager for somewhat of a change!

Meet the Graduate Students

Brad Kuntz, MS Geosciences

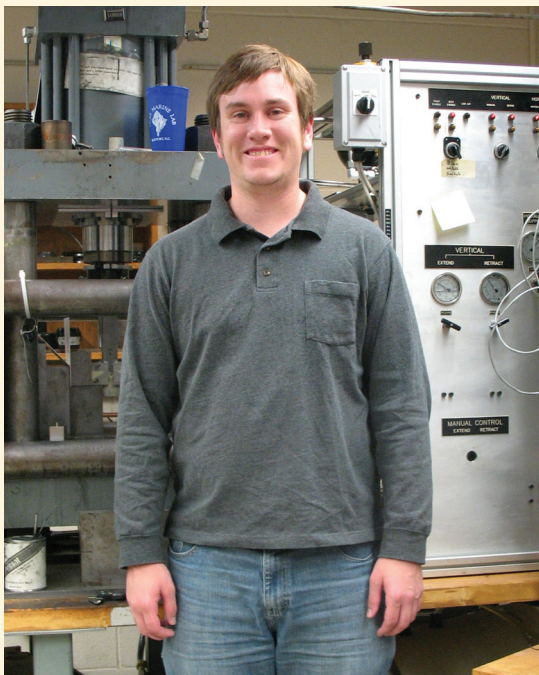
After a short discussion of my interests with Jeb Baxter (83') at Harrisburg Area Community College he poignantly informed me that "ah, you don't want to be an engineer, you want to be a geologist". I took Professor Baxter's advice and never looked back. My first experiences in hydrogeology/hydrology came as a intern with the USGS in New Cumberland, PA where I was involved in acid mine drainage monitoring, stream gaging, ground water quality, and well hydraulics. I completed an undergraduate degree in geology with an emphasis in hydrogeology at Penn State in 2008.

I am now pursuing a master's degree with Kamini Singha in contaminant hydrology. My research utilizes both geochemistry and physical hydrogeology to quantify solute transport in shale and clay-rich soils. Often, solutes in heterogeneous porous media exhibit longer-than-anticipated transport times, also known as tailing. Tailing behavior can be adequately modeled as either chemical adsorption or diffusion of solutes between mobile and immobile (MIM) fluid domains. This project seeks to evaluate the tailing behavior via both adsorption/desorption and MIM on a suite of clay-rich materials by using reactive and non-reactive tracers.

In an effort to evaluate the transport processes on different scales my experiments are run in the laboratory and the field. Presently I am working on pumping NaBr and SrBr through 'undisturbed' soil columns, measuring the permeability of shales, and analyzing tracer data from a field experiment. Over the next year I will continue to analyze experimental data and construct representative numerical models to help answer some of the 'what if' questions.



Andy Rathbun, PhD Geosciences



I am a Ph.D. student working on the mechanics of brittle shear zones. I came to the Geosciences Department from Ohio State in the winter of 2004. I started as a Master's student and completed my thesis (Class of '06) with Chris Marone on the mechanics of glacial till. I continued this research for a Ph.D. looking at the specifics of till in the laboratory and applying that study to fault zones.

As a child I was always fascinated by landscapes and how they evolved into the shapes they're in today. I was immediately drawn to geology and specifically trying to learn about the earth through the laboratory and the recreation of the processes that shape the earth. In both large fault zones and fast moving glaciers the ground-up material either inside of the fault or under the glacier is key in controlling the behavior. I perform experiments looking at the shear properties of that material.

During my Master's I found that till changes behavior style with increasing deformation. The transition implies that at low deformations till behaves as a sort of viscous material that can prevent rapid acceleration of the glaciers that drain Antarctica while at larger deformations till would not prevent acceleration. The transition inspired my Ph.D. where I look at how deformation localizes into thin zones and changes the behavior of till and fault zones. I've also conducted experiments looking at how the energy release of an earthquake is partitioned. To do this we recreate earthquakes in the lab, producing ~400 in each experiment. We look at the heating, grain breaking and, of course, seismic release. I am also looking at how the San Andreas Fault changes the fluid flow properties surrounding it. We're one of the few labs that was able to obtain core from the fault zone at depths up to ~11,000 ft. We hope to characterize how fluid flow interacts with earthquakes.

41st 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
Aaron Diefendorf



First Prize Award
Bryn Kimball



Second Prize Award
James Fulton

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



First Prize Award
Elizabeth Herndon



First Prize Award
Clay Magill



Second Prize Award
Heather Graham

Oral Presentation by an M.S. Student



First Prize Award
Jonathan Schueth



Second Prize Award
Brad Kuntz

Poster Presentations



First Prize Award
Andy Rathbun



Second Prize Award
Brett Carpenter



Second Prize Award
Claire Fleeher



Third Prize Award
Luke Zoet

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 2010 Graduate Student Colloquium is scheduled for April 19-23, 2010.

Taiwan Field Seminar

Dr. Donald Fisher and Dr. Eric Kirby

A Penn State graduate seminar on “Architecture and evolution of a Juvenile Orogen,” culminated in May with a Shell-sponsored 12-day field trip to Taiwan led by D. Fisher and E. Kirby. The Penn State group was joined by graduate students and faculty from National Taiwan University in Taipei, including the research groups of John Suppe, Yue-Gau Chen, and Yeh En-Chao (Penn State Ph.D. 2004). The trip covered all aspects of the ongoing oblique collision between the Luzon volcanic arc and the passive continental margin of China. In general, the itinerary circled the island clockwise with two transects across the Central Range of Taiwan. The field trip began with a visit to the spectacular gorge of Taroko National Park where a river is incising into the growing mountain range and has cut a mile-deep canyon, exposing the complexly deformed metamorphic basement of the passive margin. The class also examined the stratigraphy of the Coast Range that records the pre-collision evolution of the volcanic arc as well as the burial of the arc by sediments shed off



Penn State graduate student Alicia Cruz-Urbe examines the deformed and metamorphosed basement of the Eastern Central Range in Taiwan.

the mountains as they rose above sea level. Numerous fault scarps were observed that cut Quaternary river terraces, most notably the fault at the edge of the Longitudinal Valley that accomplishes 30% of the total plate convergence. In southern Taiwan, the class visited uplifted marine terraces, slope basin deposits, and the basement of mélangé that characterizes the forearc of the subduction complex south of Taiwan. In the Western Foothills thrust belt, the class observed actively-erupting mud volcanoes that are preferentially developed along faults and cores of anticlines within the thrust belt. The trip was capped by visits to the region impacted by the 1999 Chi-Chi earthquake, an event that killed thousands of people and produced a 100-km-long surface rupture. The class visited this rupture in numerous places and the trip ended at the northern end of the scarp where the surface deformation was expressed in the growth of an anticline now cut by the modern river to form a massive gorge in only 10 years. Overall, the field trip illustrated why Taiwan is viewed by many international researchers as an ideal place to investigate many of the processes associated with mountain-building.



Participants in the Shell-sponsored field trip in Taiwan from Penn State and the National Taiwan University.

Summer Field Geology in Italy

Dr. David Bice

In the early summer of 2009, six PSU Geosciences and Earth Science undergraduates participated in the first edition of a new field geology program in Italy. The program, led by PSU Professor Dave Bice and Dr. Alessandro Montanari (pictured below with the mustache), is designed for beginning students and offers a unique international experience and an introduction to field geology and the tectonic evolution of the Northern Apennines.



PSU students at the KT boundary in Gubbio. From left to right, Tom Cahill, Dana Drew, and Will Oblak, Brittany Grimm, So Young Baag, Sandro Montanari, and Travis Call. Will's left foot is sensing the iridium anomaly of the boundary clay, while Brittany is standing on the last bed of the Cretaceous, thinking about the end of an era. Appropriately, Travis is stratigraphically the oldest and Tom is the youngest.

The program was based out of the Osservatorio Geologico di Coldigioco, founded by Montanari, and frequented by geologists from around the world. Montanari is a renowned Italian geologist, specializing in impacts, extinctions, astrochronology, and paleoclimate. Coldigioco is a tiny hilltop village in the Apennines consisting of formerly abandoned houses and an old school that house various geoscience labs, dorm rooms, cooking facilities, and art studios. The students engaged in a variety of field-based exercises around the Northern Apennines, including trips to the Cretaceous – Tertiary boundary section in Gubbio (see photo below), and a week-long trip to northern Tuscany. In

Tuscany, the group stayed in a former monastery and feasted on wild boar and porcini mushrooms in the evenings, while studying the metamorphic core complex of the nearby Apuane Alps, the ophiolites and melange of an ancient accretionary wedge, and the type locality of turbidites.

The students learned a broad range of field skills, and also learned how to make thin sections, how to disaggregate, sieve, and analyze volcanic ashes, how to backstrip a stratigraphic sequence, and how to perform time series analyses of stratigraphic data. The students also learned how to make pizza, how to make fresh pasta, and a variety of other culinary skills.

The group visited the oldest geothermal plant in the world in the volcanic province of southern Tuscany; they toured the largest cave in Europe; they also spent a day hiking the coastal trail in the Cinque Terre. Days off were spent in travels to Rome, Pompei, the Adriatic Riviera, and the Dalmatian coast. The six weeks flew by, and the students and faculty returned home with memories of great geology and food and Italian culture.



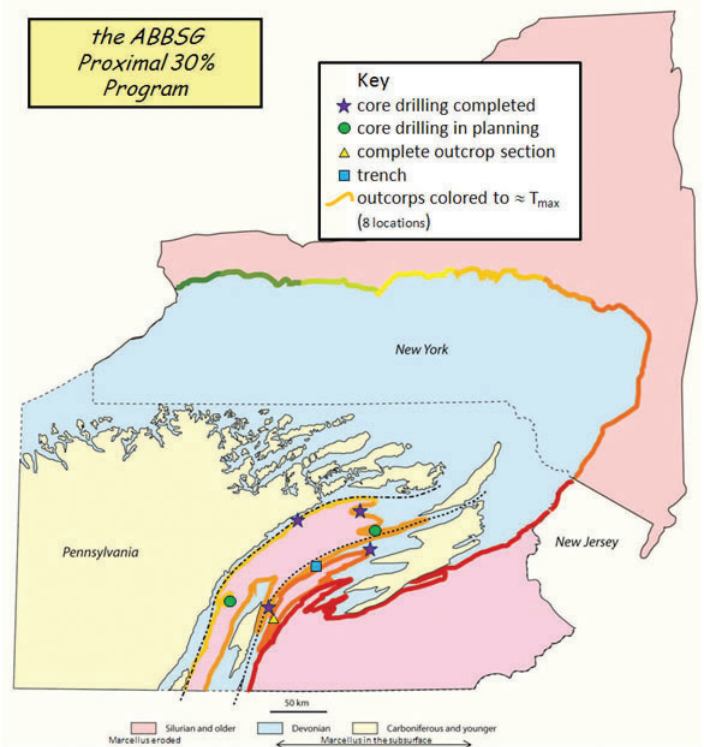
Visiting a marble quarry near Carrarra, in the Apuane Alps, with a deformed marble breccia as a backdrop. From left to right, Tom Cahill, Dana Drew, Sandro Montanari, Dave Bice, So-Young Baag, Travis Call, Brittany Grimm, and Will Oblak.

Marcellus Shale Gas Play

Dr. Terry Engelder

On January 17, 2008, the Penn State's Department of Public Information released news that there is at least 50 Tcf (trillion cubic feet) of technically recoverable gas in the Marcellus black shale based on a volumetric calculation by Gary Lash (SUNY Fredonia) and me. A volumetric calculation is used when little to no production data is available. This calculation is based on a number of geological parameters, one such as thickness, depth, organic content, thermal maturity, pore pressure, porosity, structural history, and others. In the Fall of 2008, a reporter in Pittsburgh heard me explain in a public address that Lash and I had been conservative to a fault with our January calculation and that the volume of technically recoverable gas was closer to 363 Tcf. Once production data are available, estimates for the volume of technically recoverable gas can be refined using a statistical calculation that is less driven by geological intuition. In their August 2009 issue, the Fort Worth Basin Oil and Gas Magazine published my first attempt at a statistical calculation which suggests that there is a 50% probability that the Marcellus will produce 489 Tcf during the lifetime of the field.

The development of techniques for producing gas from black shales by Mitchell Energy during the 1990s led directly to the testing of a number of North American black shale and gas plays. These included shales in Texas, Oklahoma, Arkansas, and the Marcellus over a five state region in the northeastern USA plus Canadian fields. A number of us are now convinced that the amount of gas available in America is so large that national policy should lead America rapidly away from dependence on carbon-based fuels that are either not as clean or not found in the great abundance in the USA. To give some idea about how much natural gas there really is in the USA, one can normalize gas to petroleum using a conversion factor [i.e., 6000 cf (cubic feet) x one barrel of oil (BOE)]. 489 Tcf of gas from the Marcellus alone is 81.5 billion BOE. This is almost FOUR times the present total reserves of oil in the USA (21 billion barrels).



Map of the outcrop pattern of the Marcellus shale in New York and Pennsylvania with the location of the ABBSG cores indicated in Pennsylvania.

The magnitude of this new-found resource presents an opportunity for the Department of Geosciences to play an important role in the thoughtful development of the Marcellus gas shale. Under the leadership of Department Head, Tim Bralower, the centerpiece of the department's research effort is a core-analysis laboratory. Chief scientists include Profs Mike Arthur, Rudy Slingerland and me, along with Gary Lash (SUNY Fredonia). We are the principal members of the Appalachian Basin Black Shales Group (ABBSG). The primary objective of ABBSG is to develop a model for the prediction of a basin-wide deposition/production pattern for the Marcellus (The ABBSG Proximal 30% Program). A complete predictive model must include the proximal portion of the basin including the system of near-shore channels that fed clastic material toward the distal regions of the basin. About one-third of the Marcellus basin, the

Marcellus Shale Gas Play



Department of Geosciences graduate student Reed Bracht supervises the logging of core from an ABBSG well in the Valley and Ridge of Pennsylvania. Reed is looking at the Turkey Ridge (Cherry Valley/Purcell) Member of the Marcellus Formation.

critical proximal portion, is found in the Appalachian Valley and Ridge, a region that is not prospective for Marcellus gas and, hence, less likely to be sampled by industry.

The quality of outcrops in the Appalachian Valley and Ridge is insufficient for developing a predictive model for the stratigraphy and distribution of shale properties in the Marcellus Basin. Furthermore, there are only a few complete exposed sections of Marcellus any place in Pennsylvania and most of these are highly weathered. Consequently, only through coring will ABBSG obtain continuous samples of the Marcellus, unaffected by near-surface processes, suitable for developing a predictive model that can integrate the distal two-thirds of the basin that is prospective. To this end, ABBSG sought funding from industry and government starting in the spring of 2008. Support for our coring program initially came from three

operators [Range Resources, Talisman (Fortuna) and Samson] and government (PA-DCNR). During this same period, support for graduate students came from Chevron, Conoco-Phillips, and DOE-NETL. To date we have completed coring in four wells, with two more planned. Each well was spudded in the Mahantango and completed in the Onondaga Limestone or a deeper formation. Early results will be shared with participating members as the data are collected and analyzed.

Based on the success of the coring program to date, ABBSG plans an additional solicitation for funds from operators. Our goals include the purchase of two essential pieces of equipment: 1) a non-destructive core-logging/scanning system including spectral gamma-ray, spectral color, magnetic susceptibility and p-wave velocity; and 2) a whole-core, non-destructive x-ray fluorescence device for fine-scale geochemical analysis. Other funds will be used to support graduate student research that contributes to the heart of the predictive whole-basin model for the Marcellus. Penn State's core-analysis laboratory is being designed as a research and training facility for graduate students, particularly those whose careers might take them into the gas-shale industry, and as a resource for energy companies.



The Penn State Core Laboratory (located on the 2nd floor of Research West)

Peter Deines: 1936-2009

Teacher, Scholar, Gentleman



Peter Deines, Emeritus Professor of Geochemistry, died at age 72 in State College, Pennsylvania on February 2, 2009, after a protracted battle with cancer. Peter was a Penn Stater for 50 years. He came to Penn State in 1959 with a Geologen Vordiplom from the Rheinsche Friedrich Wilhelms Universitaet, Bonn, Germany, receiving an MS

(1964) and a PhD (1967) in Geochemistry and Mineralogy from Penn State. He served as a Professor in the Department of Geosciences beginning in 1967 and attained Emeritus status in 2004. He taught many courses including Geochemistry, Hydrogeochemistry, Introduction to Stable and Radiogenic Isotopes in Geosciences, Stable Isotope Geochemistry, and Radiogenic Isotope Geochemistry. His courses were demanding but popular among students; they knew that Peter genuinely cared about them and that they were learning the real science. A measure of students' appreciation of Peter was their nomination of him for the college's Wilson Award for the Excellence in Teaching, which he received in 2004.

Peter's colleagues recognized him as a most unselfish, honest, gentle, responsible and well-organized person who genuinely cared about the welfare of students, faculty, staff, and Penn State. He was asked to serve in many important administrative positions in the Department of Geosciences, such as Chairman, Geochemistry and Mineralogy Graduate Program (1983-1988) and Associate Department Head for Graduate Programs and Research (2001-2004). Most important was his commitment to the University Academic Senate, in which he served in 28 committee posts, including its Chair for 1990-91; and to the University, on 34 committees and commissions, including University Ombudsman since 2006. He also was elected President of the Faculty-Staff Club. Recognition by his professional colleagues resulted in election as Treasurer of the International Geochemical Society. In that office, he was so effective that he was awarded a unique Honorary Life Membership for his financial management of the society. In 1995 and 1997 Peter served as a principal organizer of the

first and second Goldschmidt Conference, which has grown to attract about 3,000 geochemists each year, and is one of the largest international meetings of geological sciences.

Peter was a world-renowned stable isotope geochemist. His research was mostly directed to increase our understanding of the principles that govern the distributions of isotopes of carbon, oxygen, hydrogen and nitrogen among various natural compounds. Peter pursued this goal with isotope analyses of thousands of experimental products and natural samples (waters, gases, minerals and rocks). In fact, Peter submitted his last manuscript written with Dave Egger, Emeritus Professor of Petrology, for publication in *Geochimica et Cosmochimica Acta* only a week before his death. Peter was very interested in the origin of carbon in the Earth and the geochemical cycle of carbon through the core, mantle, crust, oceans, atmosphere and biosphere.

Recently, geoscientists have discovered the existence of a much larger-scale cycling of carbon, which involves the lower mantle (and possibly the core) and may take about a billion years to recycle. Recognition of this cycle has developed largely from Peter's investigations of the carbon isotopic composition of diamonds. Diamonds are typically formed at depths between 100 and 400 km in the upper mantle, but some may have formed in the lower mantle. Therefore, they provide information on the nature of carbon in the deep Earth. Peter analyzed hundreds of diamonds from different parts of the world, and recognized that their carbon isotopic compositions greatly vary within and between different regions. An important conclusion from Peter's investigations is that the isotopic composition of carbon in the mantle is not homogeneous.

Peter acknowledged the possibility that the heterogeneity in carbon isotopic compositions arose because the mantle was not thoroughly mixed during the stage of magma oceans, and because most diamonds possibly formed from gaseous reactions involving CH₄ and CO₂ of different isotopic composition. These were new ideas concerning the origin of carbon in the Earth and how the early Earth evolved. Like diamonds, Peter's works, especially his analytical data on experimental and natural samples, will remain as some of the most valuable data in geochemistry for a very long time. Future geoscientists will further advance Peter's ideas to increase our understanding of how the Earth was created, and how the life and environment evolved together. We miss him greatly, but we also recognize that we are fortunate to have had Peter Deines, a great teacher, first-rate geochemist, and true gentleman, as our colleague and our friend.

Dr. Hiroshi Ohmoto

Alumni News

Ronald W Stingelin, '65 PhD

Ronald became a grandfather on July 17, 2009. Julia Sienna Stingelin was born in Tucson, Arizona daughter of two Penn State alums, R. Douglas Stingelin, '00 Master of Architectural Engineering and Angela Michelle Conklin, '03 MS Ecology.

Robert F. Martin, '66 MS

Here are some tidbits of news. I have retired from active teaching duty, but remain heavily involved in research activities and in supervision of one Ph.D. candidate. At the May convocation, I was awarded the rank of Emeritus Professor, which at McGill University is rather selectively given (two in the entire Faculty of Science this Spring). I remain editor of *The Canadian Mineralogist*, something that I have been doing since 1978 (volume 16). I am now publishing volume 47! Last year, I published two major books, one on Pegmatites by David London, and one on Migmatites by Ed Sawyer (both Special Publications of *The Canadian Mineralogist*). I am now returning to a long-term project, an Atlas of Non-Silicate Minerals in Thin Section, which I hope to have in circulation before the IMA meeting next year in Budapest. Next time, I will tell you about the new mineral species MARTINITE, almost as complex as its namesake!

Jeff Pepper '71 BS

After working in both consulting and government over the first 32 years of my career (1972-2004), in 2005 I joined a small hydrogeologic consulting group named AquaFUSION, which is involved in projects over much of the eastern U.S.; and which was, coincidentally, co-founded by a former PSU Geosciences graduate student (David Buss, Ph.D.).

Albert Ogden '72 BS

I am a hydrogeology professor at Middle Tennessee State University and am Curator of our new Mineral, Gem, and Fossil Museum that I started a little over 3 years ago. My recent news is that I was on sabbatical leave Spring semester in the Philippines where I was working on a rainforest restoration project...my job was to locate ground water for irrigation wells for the seedlings. While there, I presented the Philippines Speleological Society with a small grant for rescue and vertical equipment. We started exploring and mapping new caves in an area near my wife's home on the island of Cebu and on the very first trip discovered ancient burial pots full of human bones. They are now on display

in the new provincial museum. I found two more cave sites later with burial pots and bones. On a final note, I bought a small bar/beach resort to run come my retirement which I hope to be soon.

Robert C. Smith, II '73 PhD

It has now been 4 years since I left the Pennsylvania Survey, but still enjoy doing geochemistry and geology. Some is curiosity-driven research and some is consulting, but both have been interesting. During the past year, four papers and articles, all done with coworker John H. Barnes, have come out. A pair of papers appeared in the *Pennsylvania Academy of Sciences* 82: one covered what we think we know about the Goat Hill Serpentinite area of the Baltimore Mafic Complex and the second provided bedrock geochemistry for the Goat Hill Serpentinite tract and proposed a quantitative "serpentine factor" to aid in floral restoration. A short article in the 73rd Field Conference of *Pennsylvania Geologists* guidebook covered a (Ag,Cu)/Te and some CuBiS's from a Mesozoic skarn exposed in the Valley Quarries, Inc. Gettysburg Quarry. The last article wrote up SEM/EDS analyses of the PdSb sudburyite from ferrogabbro in the York Haven Diabase in *Pennsylvania Geology*.

Current work involves: 1) getting out a geology map of the 432 Ma olivine melilitite area, Clear Spring, MD, just south of the Mason-Dixon Line. 2) Silurian-Devonian, Devonian-Mississippian, and Triassic-Jurassic boundary sections. 4) Mesozoic telluride minerals in Pennsylvania. 5) Neoproterozoic iron deposits in New Jersey. 6) Catoclin Metarhyolite with the Pennsylvania Museum and Historic Commission. 7) Thermal history of the Reading Prong via titanite-zircon-apatite FTA data from a few sites where all three might be recovered. Thermal history of Pennsylvania in general. 8) Eocene volcanic rocks. My interest continues in U-Th in PA and As in PA, mainly as they may relate to environmental concerns.

Wife, Gloria, and I are now into our third year of providing play daycare four days a week for granddaughter Kalina. We visit with our slightly older granddaughter Lily Beth as often as we can. Home fruits and vegetables and church activities help keep us out of trouble.

Steve Mellon, '76 BS

Sphalerite has over 100 varieties as Dr. Thornton always made sure we remembered! Ignorant rocks (igneous) rule!

Alumni News

Water does flow uphill in some places like South Dakota Life is just a big matrix like Rock Mechanics. Yeah I am a nut!

Roger K. McLimans '77 PhD

I will be part of an expedition to the west coast of Greenland this summer, leaving in a day, lead by the Geological Survey of Denmark and Greenland. The team will be mapping, sampling for age dating, petroleum and mineral potential, and climate change.

James H. Anspach '77 BS

James served as a keynote speaker at the "Construction Research Funding in the XXI Century: A Partnership Between Academia, Industry, and the Public Sector" workshop. This workshop was sponsored by the National Science Foundation and the World University Network, and illustrates the cross-cutting nature of the Geosciences profession today. The knowledge gained through study of the geosciences is pertinent to virtually every aspect of our built environment. He is Chair of the American Society of Civil Engineer's Construction Standards Council, and is the incoming Chair of the Codes & Standards Board Committee. He is considered a principal founder of the subsurface utility engineering profession and can be reached at Jim@JHAnspach.com.

Fredrick Rich, '79 PhD

I carry my Penn State pride with me everywhere I go. My wife, Sherry, and I both graduated from PSU some time ago. I got my PhD in '79, and she got her MS in '82.

Right now I'm on St. Catherines Island, off the Georgia coast. We're conducting our annual sea turtle monitoring program, where we take in-service teachers out to the island to look for, characterize, and otherwise collect data from loggerhead sea turtle nests. This morning we recorded six crawls, three of which had nests. This was an unusually good morning, and the teachers, most of whom had never done this before, were thrilled. This is the most wonderful way to teach the interrelationships among geological processes, geomorphology, and animal behavior. When I was finishing my work on the Okefe nokee Swamp at Penn State I would never have thought that 30 years later, I'd be back in Georgia working on a barrier island.

These are good days, and I wish the same to all my old friends from Penn State, and to the students who are just beginning. You never know where you'll end up, or what you'll be doing,

but if you're a geologist it is likely to be something great.

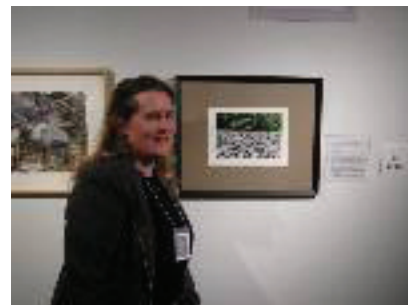
Martin Farley, '80 BS, '87 PhD

I am currently President of the North American Micropalaeontology Section of SEPM. Feel free to get in touch with any questions: Martin B. Farley, Dept of Geology & Geography, UNC-Pembroke, Pembroke, NC 28372 or at mbfarley@psualum.com

Dan Black, '86 BS I am working as a Manager of Sustainable Energy for Delta Energy LLC in Dublin, OH. My role includes assisting industrial and commercial customers with understanding how carbon emission regulations will impact their operations, calculating their carbon "footprint", and understanding how they might use renewable energy and implement energy efficiency projects. Oh, and we endure football season here in the greater Columbus, Ohio area.

Kathryn West, '88

Kathy had a photograph as part of the Delaware Women's Conference 2009 Juried Fine Arts Exhibition. She was one of thirty-five women artists in Delaware to be selected for the exhibit, called "The Possibilities of Pause," which ran from March 7 through April 19. Her piece is a photograph entitled "Glacial Boulder Field, Hickory Run Pennsylvania State Park 2004."



John T. Leftwich, '93 PhD

Received the Randolph W. "Bill" and Cecile T. Bromery Award for Minorities from the Geological Society of America for 2009.

Keith Saroka, '93 BS

I am entering my 17th year as Science Teacher in the Interboro School District (10th as department head) and am moving to West Chester, PA in August. Completed 17th and 18th Pennsylvania Space Grant Consortium Graduate Summer Science Teacher workshops summer 2009.

Alumni News

David Pinkus, '98 BS

David teaches Physics at the Biotechnology High School in Freehold, NJ.

Andy Sicree, '99 PhD

Andy lives in Boalsburg with his wife Rebecca and their ten children. He teaches geosciences classes on an adjunct basis at the Penn State Harrisburg and Altoona campuses, and he teaches physics and chemistry part-time at Grace Prep, a private high school in the State College area. He notes that "teaching science is my real passion" and that he enjoys teaching undergraduates.

He has also been mildly successful as a free-lance writer writing for a wide variety of magazines including ChemMatters, Columbia, Lost Treasure, Touchstone, State College Magazine, and QRW, the Quarterly Review of Wines. Recently, his article on "Morocco's Trilobite Economy" appeared in the March/April 2009 issue of Saudi Aramco World (see it at <http://www.saudiaramcoworld.com/issue/200902/morocco.s.trilobite.economy.htm>). He has published on the web a series of articles aimed at helping geoscientists do interesting demonstrations of mineral properties (check out the Mineral Information Institute web page www.mii.org/pdfs and see the 15-Jun-2008 pdfs). He also authors and publishes a monthly newsletter, Popular Mineralogy, which is distributed nationally; it can be viewed at www.ems.psu.edu/nms/bulletin.

In his spare time Andy runs the African Book Project, an effort to send donated used books to libraries in book-poor nations in Africa. To date he has shipped more than 70,000 books to libraries in Kenya, Nigeria, Ethiopia, and Tanzania. Fellow PSU geosciences alums are always welcome to contact him at sicree@verizon.net.

Frank T. Caruccio, '63 MS, '67 PhD

Frank T. Caruccio of Columbia, SC, died on July 29, 2009. He was a professor at The University of South Carolina from 1971-1999 and was an associate department head for 10 yrs. A member of the South Carolina Mining Council from 1973 to 2000, Dr. Caruccio was its first chairman, holding that position for two years. There, he was influential in drafting the State's Mining Act for South Carolina.

John William Gillis, '64 PhD

It is with great sadness that I wanted you to know of the

death of my great friend, Dr. John William Gillis on Saturday, August 15, 2009. Bill and I were both graduate students in Geology in the early 60's and had remained friends since that time. Bill was very active while a student in Department affairs as well as the University Club where we both lived. Since his graduation in 1964 he worked with the Canadian Geological Survey, was a Geology Professor at St. Francis Xavier University, and recently very active in the Nova Scotia Provincial Government. Bill did his graduate studies under Robert Scholten. He liked field work and his dissertation was a field study of some area of Nova Scotia. Best regards, Earle (Skip) Lenker

Neil Franklin Cooper '76 BS

Neil Franklin Cooper of Cherry Hill, NJ, died on May 9, 2009. Neil was employed by PricewaterhouseCoopers as a Managing Director in the Risk Advisory division at the time of his death. He had been a guest lecturer for various classes at the Penn State School of Information Science and Technology and was a Life Member of the Penn State Alumni Association. His wife, Helene Kronstadt Cooper, is a '77 Education graduate.

Carolyn A. Petrus, '79 MS

Carolyn A. Petrus of Port Matilda, PA, died on August 30, 2009 at her home. She was a licensed member of the PA Professional Engineers, Land Surveyors and Geologists and worked for 25 years as a geologist in Pennsylvania.



We're now on Facebook!

The new Penn State Geosciences Facebook Page provides us with an engaging and participatory platform to update you on events. On our Facebook Page, you can contribute photos and comment about current or past events on "The Wall."

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Richard & Cindy Alley
Lance C. Anderson
Charles E. Angerman
Michael A. Arthur & Janice A. Jenkins
Janet Atwood
Robert W. & Barbara G. Avakian
Joseph I. and Judith L. Axelrod
Vanessa L. Balint
Timothy A. & Anne Hamblin Bastian
James E. & Stephanie Bryan Bedison
Thomas H. Bennett
Rhonda J. Bent
Joseph W. & Glenda S. Berg
Lawrence & Kathleen M. Bermel Danner
Abraham Biadgelgne & Alga Zewoldi
Troy J. Bloom
Jennifer K. Bobich
Claude E. Bolze
Zoe E. Boniface
John and Ann Brabazon
Timothy J. Bralower & Mary Lee Kerr
Garry L. & Karen H. Brannon
Charles A. & Patricia A. Brinkley
Jacob K. Brown
Tucker D. & Danielle M. Burkhardt
Edward G. & Dorothy Buss
Heather L. Buss
John M. & Karen R. Campbell
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Christopher B. & Martha Cobb
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H. Nathan Fisher
Kevin P. Furlong
Tanya Furman & Daniel Larson
Thomas J. Gebbie
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David P. & Jacqueline E. Gold
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Andrew B. & Gena M. Kovalcik
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Thank you for supporting our programs!

From the Dean

Dear Geosciences Alumni and Friends,

I am delighted to share with you the good news that the Burrowes Road entrance to Deike Building (home of the department) has undergone a much needed facelift during the late spring and summer. Through the generosity and thoughtfulness of Helen Lee Henderson (granddaughter of George H. Deike, Sr., the namesake for the building), the entrance has been completely gutted and new steps, a ramp, and attractive landscaping will greet all alumni, students, visitors, faculty and staff. (Just in case you are wondering, the concretion has been moved to the back corner of Deike and Hosler Buildings.) I hope you come by on your next visit to campus to view the new entrance.



As I'm sure you realize, Penn State has been affected in numerous ways by the recent downturn in the economy. Our funding from the Commonwealth has decreased; a tuition increase was unavoidable; salaries were frozen for administrators, faculty and staff; interest on endowments decreased which in turn decreased the amount of funds available for scholarships while there was a concurrent increase in the number of students who applied for scholarship support; the job market for our recent graduates was tighter than we had hoped; and cost-cutting strategies have been implemented at all levels. The next few years will no doubt present many challenges and will demand difficult decisions, but, as I have already told my faculty and staff, "we will get through this to better times."

We just recently learned that philanthropy to Penn State continues to be strong despite the recession. During the 2008-09 fiscal year, the number of gifts from alumni set a record for the University. This support for our students and programs during these difficult economic times reflects the commitment of our alumni and friends to provide current and future students with the same high-quality educational opportunities enjoyed in past years. I thank you for your generous support for our students.

With best regards,

A handwritten signature in blue ink that reads "Bill Easterling". The signature is written in a cursive, slightly slanted style.

William E. Easterling
Dean

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.

The Pennsylvania State University
Department of Geosciences
503 Deike Building
University Park, PA 16802

Phone: 814-865-6711

Fax: 814-863-7823

Email: alumni@geosc.psu.edu

Web: <http://www.geosc.psu.edu>

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