College of Mines and Earth Sciences
The University of Utah

The Present 2013
LETTER FROM THE DEAN

Dear Friends and Alumni,

It is hard to believe that another year has passed, but time flies when you’re having fun, and it is definitely fun to see the college continue to grow in its strengths, and change in ways that are better for all involved.

Enrollments remain strong. In Mining Engineering, the number of undergraduates has nearly doubled in the past two years, and that is also the case in Geology & Geophysics. We’ve hired a recruiter, and hope that we will see increases in Metallurgical Engineering and Atmospheric Sciences in the next academic year. The job market absorbs all of the graduates we produce. Classes are full, especially in the introductory courses, and this is a welcome change from the sometimes rather sparse classes of the past.

The college has more new faculty—Jeffrey Moore, Lowell Miyagi, and Fan-Chi Lin, in Geology and Geophysics. All have replaced retired or departed faculty. More retirements and partial retirements have also either taken place (Ron Bruhn), or have been announced (Barb Nash will begin phased retirement next year). We already miss Ron, but are pleased that Barb will phase out over a couple of years giving us time to adjust. Some of us (e.g., me) don’t look up often enough to notice that we should also make plans for the future. Dave Chapman completed his full retirement last year, but he remains completely engaged in our progress.

Research output and research funding also continue at a high level, with Metallurgical Engineering and Atmospheric Sciences leading the way. Our faculty continues to garner well-deserved recognition. Marjorie Chan has been named the 2014 Distinguished GSA International Lecturer, and Rocky Sohn has received the 2014 TMS Educator Award from the Minerals Metals and Materials Society. Are we happy that our students brought us international recognition by winning the Imperial Barrel Award in the last competition? You bet we are! They’ve created an endowed student support fund with the $20K check that came with the award.

To close, let me thank all of you who have given back to help our students in their studies. Little notes that some of you send really brighten up the day, so keep them coming. It is good to know that most, if not all of you, have good memories of your days here.

Yours sincerely,

Frank

[Graph of Total Enrollment]
GG Students Win International Oil Prize

A team of University of Utah geology and geophysics graduate students took the top prize – the Imperial Barrel Award – on May 19th in Pittsburgh during the American Association of Petroleum Geologists’ annual convention.

“This comes with major bragging rights -- plus a $20,000 check,” says Cari Johnson, an associate professor and recent associate chair of Geology and Geophysics. “In the Department’s very first try, we won.”

The five students on the winning U team were Alexandre Turner, Marko Gorenc, Morgan Rosenberg, Tyler Szwarz, and Mason Edwards.

They were advised by Lauren Birgenheier and Lisa Stright, both assistant professors of geology and geophysics. Aksel Quintus-Bosz of Chevron and Matt Heumann of ConocoPhillips served as the team's industry consultants.

“The team won the regional Rocky Mountain competition in Denver against seven other teams, which advanced them to the international finals in Pittsburgh,” says Birgenheier. “On May 19th they competed against 10 other teams (five U.S. regional teams and five international teams). They placed first in the final competition, beating the University of Oklahoma.”

There were 107 teams with 535 students competing in the event. Each team had eight weeks to work up and present a detailed assessment of a parcel’s potential for hydrocarbon production using real seismic-imaging and well data, in this case from Australia’s Cooper-Eromanga Basin. The teams each made a 25-minute presentation to a panel of judges on their technical recommendations, followed by a question-and-answer session.

Introductions

Peter Lippert
Geology & Geophysics

Fan-Chi Lin
Geology & Geophysics

Michael Simpson
Metallurgical Engineering
Kevin Perry

Atmospheric Sciences

The faculty in the Department of Atmospheric Sciences continues to amaze me with the high quality research they conduct and the complexity of the field experiments that they lead. In the last year, tenure-line faculty published 35 refereed journal articles, three book chapters, and a major technical report for the U.S. National Climate Assessment. They also led and/or participated in three major field experiments providing excellent opportunities for student participation.

The Mountain Terrain Atmospheric Modeling and Observations (MATERHORN) program was the largest field experiment in the Department this year. This experiment was funded by the Multidisciplinary University Research Initiative Program and includes participants from the University of Utah, University of Notre Dame, Naval Research Laboratory, Naval Postgraduate School, University of California, Berkeley, University of Virginia, and the U.S. Army Dugway Proving Ground. The goal of the experiment is to improve weather forecasting in mountainous terrain using facilities and instruments at the Granite Mountain Atmospheric Science Testbed (GMAST) and at the U.S. Army Dugway Proving Ground in Utah.

The second Meteor Crater Experiment (METCRAX II), which was led by the Mountain Meteorology Group, is investigating the downslope-windstorm-type flows that develop when thermally-driven drainage flows cascade over the rim of the Barringer Meteorite Crater on clear, undisturbed nights. These flows are ubiquitous in mountains throughout the world, but occur on a regular basis in this axisymmetric basin on scale that is uniquely amenable to observation with surface-based instrumentation.

Also of significance is the appointment of Dr. John Chun-Han Lin as a tenured, associate professor. He comes to us from the Department of Earth and Environmental Sciences at the University of Waterloo. He holds B.A., M.A., and Ph.D. degrees from Harvard University and is a key participant in the Global Change and Sustainability Center. His research expertise is in the areas of air quality and the exchange of greenhouse gases and pollutants between the land surface and the atmosphere. Lastly, the Department of Atmospheric Sciences continues to provide leadership in the area of climate change by making a major contribution to the Assessment of Climate Change in the Southwest United States (http://swccar.org/sites/all/themes/files/SW-NCA-color-FINALweb.pdf).

John Bartley

Geology & Geophysics

I am honored to take over from Kip Solomon as chair of the Department of Geology and Geophysics. Kip provided excellent leadership through a time of rapid growth and evolution of the department, and I hope to continue the momentum that we have built.

Our number of undergraduate majors has roughly tripled over the last five years. This has stressed some resources—we already are pressed for space in the Sutton Building, which seemed spacious only four years ago—but the growth also has fueled new initiatives in the department.

We have regretfully seen the retirements of long-serving faculty members, most recently Ron Bruhn and Peter Roth. However, such departures have permitted us to build a cadre of young scientists and engineers who are leading the department in new and exciting directions. Jeff Moore and Lowell Miyagi joined the department in January 2013. Jeff is a geological engineer who specializes in slope stability. He combines seismic and geodetic monitoring with numerical modeling to assess the stability of cliffs and anticipate failure. Lowell is a mineral physicist who performs ultrahigh pressure experiments to study the mineralogy and rheology of the deep mantle. His work thus closely links to deep Earth investigations by our seismologists Michael Thorne and Keith Koper. Fan-Chi Lin joined the department in October 2013. Fan-Chi developed the mathematics needed to do interferometry using seismic waves. Interferometric methods make it possible to extract more information about the Earth’s internal properties from seismic data than has hitherto been possible, such as imaging spatial variations of rock density that previously was possible only by using an assumed relationship between density and seismic velocity.

A direction of marked growth is our program in energy-related geoscience. A steadily increasing number of oil companies come to campus annually to recruit our students, and the competition has become intense. Flourishing petroleum-related research includes development of predictive models of subsurface stratigraphic architecture based on outcrop studies and stochastic modeling, and stratigraphic and structural characterization of unconventional hydrocarbon reservoirs. A new source of support for the program is the Energy Initiative Fund, an endowment that was started using the $20,000 first prize garnered by a team of our graduate students in AAPG’s Imperial Barrel Award competition.

In short, the department is both growing, getting younger, and evolving rapidly. It is a very exciting time for us!
Manoranjan Misra  
Metallurgical Engineering

Welcome to the Metallurgical Engineering Department at the University of Utah. Our Department is doing exceedingly well with respect to funded research, scholarly work, undergraduate and graduate student enrollment and student graduation. We have added several new faculty members with diverse educational and research backgrounds. The Department is expanding its teaching and research activities in the areas of traditional process engineering to sustainable technology, advanced manufacturing, renewable energy, and nuclear materials.

The Department is highly recognized in the country and has maintained its identity as a real metallurgical engineering Program. Because of Dr. Miller’s leadership over the last 10 years as the Chair (as faculty for over 40 years), and the dedication of our highly motivated faculty, we are one of the top metallurgical programs in the nation. We are recognized all over the world and have graduated and placed our students in over 100 countries since 1901.

The Department has several research centers and nationally recognized facilities. Recently, we established the Roger and Dawn Crus Center for Renewable Energy with a significant private gift. This Center is dedicated to teaching, research and outreach.

In addition, we have highly recognized Computer Tomography, Electron Microscopy and Mineral Processing facilities.

We would like to thank our alumni, friends and industry partners for their strong and continueing support and encouragement. Please do not hesitate to contact me with any comments or suggestions. Finally, I must say it is indeed a great pleasure as an alumnus of the metallurgical engineering program to come back to lead the Department after 30 years.

Michael Nelson  
Mining Engineering

Since our last report, the Mining Engineering Department added a new faculty member. Dr. Ilijad Miskovic joined us in January 2012. (His wife, Sanja, joined the Metallurgical Engineering Department at the same time.) Dr. Miskovic is from Serbia, where he worked in the electric power industry and received degrees in process engineering and control. He completed his Ph.D. at Virginia Tech, doing research in the injection of CO2 into coal formations. Dr. Miskovic teaches Mineral Evaluation and Engineering Design, and is pursuing research in areas related to the movement of fluids in rock formations, to better understand hydraulic fracturing, gas injection, and fluid recovery.

In May, Samantha (Sam) Davis joined the staff of the College of Mines and Earth Sciences as our outreach coordinator. Sam is supported by significant cash grants from three mining companies—Rio Tinto Kennecott, Freeport McMoRan, and Newmont Mining—and with funds from the Dean’s Office. She has already visited many middle schools and high schools in Utah, and her enthusiasm and creativity will certainly help us attract more students.

The department received two significant research grants in 2012. Dr. Calizaya and Dr. Nelson will lead a study using pressure balancing ventilation techniques to control spontaneous combustion in coal mines, funded by the Alpha Foundation for the Improvement of Mine Safety and Health. Prof. Hethmon and Dr. Nelson will conduct a study of safety management in small mines, funded by NIOSH. These two projects will bring almost $800,000 in funding to the Department.

The Center for Mining Safety and Health Excellence was officially organized in 2012, with Prof. Hethmon as director. The center is a global resource for the mining community dedicated to the belief that zero harm to miners and their communities is both an opportunity and an expectation. The center has already conducted more than 20 training courses for various companies and professional groups, and looks forward to increasing these and other activities.

Department enrollment continues to increase. We now have 106 undergraduate and 15 graduate students. The Department is eager to place all our students, first in internships and then in full-time jobs. We continue to be grateful to many companies and individuals for their support in providing funds, hosting field trips, delivering guest lectures, and mentoring students. In August, just before classes started, three groups, each with two faculty members and 14 second-year students left the U at 6 A.M. on a Monday morning. Each group visited five mines in four days, including sites in Colorado, Idaho, Montana, Nevada, Utah, and Wyoming. The students had a great time, and came back with a much better understanding of what mining engineers do.
Our Students

Brian Blaylock
Atmospheric Sciences

Education has been important throughout my life. In high school I took advanced placement science and math classes to prepare myself for college. Because of my efforts and the instruction from good teachers, I “hit the ground running” and anticipate graduating this May after four years of university study. Continuing my education in graduate school, I will build on the scientific foundation I have already established. In addition to research, I hope to teach at a university. As important as research is, it is equally important to train and assist others who will come into the field after me. My professors have been great mentors and I want to do the same for others.

The following is a review of my experiences as an undergraduate student. Aside from regular class work, I have worked as an undergraduate research assistant in the Mountain Meteorology Group at the University of Utah. Currently, I work as student support for MesoWest and have been involved in two field projects: the Uintah Basin Ozone Study (UBOS) and Mountain Trench Atmospheric Modeling and Observations Program (MATERHORN).

For the UBOS field program, I helped install vehicle-mounted sensors that were used to measure weather and ozone levels over a large portion of the Uintah Basin in eastern Utah. During the MATERHORN campaign, I participated in three intensive observation periods. Working closely with professors and graduate students, I operated a tethered balloon and launched several rawinsondes.

Last summer, I was selected to participate in NASA’s Student Airborne Research Program. Working closely with faculty, other researchers, and graduate and undergraduate students from around the country, I participated in five research flights on the DC-8 flying laboratory. My role was to assist with instrument integration before the research flights and monitor trace gas concentrations during the flights.

My other activities outside the classroom include the following: president of the University of Utah Student Chapter of the American Meteorological Society, participant of local and national forecast competitions, and volunteer at the University of Utah sponsored Science Olympiad and Science Day for high school students.

My education at the University of Utah has prepared me for graduate school and future roles I will have as a contributing scientist in the atmospheric science community.

Afe Langi (Si’i)
Geology & Geophysics

I was born in Tonga, which is a group of small islands in the South Pacific. I am number 12 of 14 children in my family and I have always been close to my siblings and my extended family. In 1994, I moved to the United States to join my parents and several siblings who had moved here a few years ahead of me. I graduated from Highland High school here in Salt Lake the next year and then attended the U for one year in which I did very poorly in all of my classes. I was still an English language learner at the time and I was not very familiar with American culture and definitely not familiar with the academic system.

After my less than satisfactory start in higher education, I served a full-time mission for the LDS church in New York City where I spent most of my time in Harlem. I loved my time there and was able to develop a lot of skills including English. When I returned from New York, I decided to join the Utah Army National Guard. I joined the aviation unit and I was in basic training on September 11, 2001. I was later deployed to Afghanistan in 2004 and again in 2008. Between deployments I switched from the aviation to the military intelligence unit and had the opportunity to study Persian-Farsi at the Defense Language Institute in Monterey, California.

In Monterey, I met and married my wife, who helped introduce me to my first taste of geology when she took a job in Baku, Azerbaijan. We lived there for several months and I was introduced to the oil and natural gas industry as well as to the unique geological features of the area. When we returned to the states, I decided that I needed to pick up my education again and I was set on geology.

I am now a senior in the geoscience major with an emphasis in geology, and I am happy to report that this second round of university study is going much better than the first. My wife and two kids help keep me focused. I love the courses and the professors and the work that I get to do. I am looking forward to graduation this coming May and I am interested in pursuing a career in mineral exploration that could take me anywhere in the world.
Samar Emami
Metallurgical Engineering

Samar Emami came from Iran in 2009 to begin her doctorate in the Metallurgical Engineering program. Initially drawn in by the beauty of the University of Utah campus and familiarity of the mountains, Samar’s decision to apply was solidified after she found the graduate program specifically dedicated to Metallurgical Engineering. She chose to work with Professor Sohn as he is world renowned in the metals industry. Samar was amazed at not only his expertise on the subject matter, but also how well he could convey his knowledge to both undergraduate and graduate students.

Samar’s thesis work focused on the kinetics of magnesium oxidation under various atmospheres. Magnesium is a highly reactive material that does not form a protective oxide layer in air like other metals, such as aluminum. Exposure to air can become detrimental during the casting process due to continuous burning of the magnesium, resulting in metal loss. Samar found that magnesium could be protected against oxidation degradation by adding small amounts of SF₆ and/ or CO₂ to the surrounding atmosphere during the casting process.

After her May 2013 graduation, Samar became an Analytical Scientist at US Gypsum (USG). Currently working in the analytical lab of the corporate innovation center, she is part of a team to help other USG labs characterize newly invented and modified materials. Her extensive metals knowledge and characterization expertise gained at the U of U is now used to provide a deeper understanding of USG products. She credits her proficiency in these topics not only her research, but also from the variety of courses and professors who encouraged systematic thinking when faced with a challenge.

Patrick Guild
Mining Engineering

I was born in Wichita Falls, Texas, in 1984 on Shepard Air Force Base. Though my parents both left the Air Force after their first enlistments, their service would end up as one of the building blocks in my future. I lived in Texas for 5 years. As a family, we moved to Lakeland, Florida, where I spent the majority of my childhood years. Florida was hot and miserable, but we could always go fishing minutes from where I lived, considering we lived on top of the aquifer that my entire town was built around sink-holes. I also regularly visited the limestone caves and natural springs. After 12 years in Florida, my family moved to Oshkosh, Wisconsin, where I attended high school. I completed high school in Wisconsin before I joined the Marine Corps in 2003.

Out of high school I was recruited to play football for a few of the Wisconsin schools, including the Badgers. I also was offered a full scholarship for the Army ROTC program, with the intentions of becoming a chaplain, which was my interest at the time.

Instead, I enlisted in the Marine Corps Infantry. I definitely chose the path of most resistance. My Marine Corps career included 2 deployments to Iraq as a machine gunner, where I was wounded in Fallujah in 2004 during Operation Phantom Fury. My wounds were minimal compared to those received by many others. After my 2 deployments, I re-enlisted to train reservists in southern California.

I married my wife (from Utah) in 2009, got out of the Marine Corps in 2010 and we headed back to Utah hoping to make a home for our family (she was pregnant at the time). As I made the transfer from military life to civilian life, I knew the best thing for my family was to humble myself and revisit the idea of a college education that I had considered 7 years before.

As a leader in the Marine Corps, I took pride in my ability to contribute to the overall well being of my troops. I have found a parallel atmosphere in the mining community. The professors and students function as a team. While the atmosphere is competitive, we are all there for each other.

P.S. - Patrick did not mention that he received a Purple Heart while serving in Iraq.
Professional

Thure Cerling
2012 Utah Governor’s Medal for Science and Technology

Marjorie Chan
2013-2014 Geological Society of America (GSA)
Distinguished International Lecturer

Michael Zhdanov
Honorary Membership in the Society of Exploration Geophysicists

Vince Salomonson
Honorary Member of the American Society for Photogrammetry and Remote Sensing (ASPRS)

University and College Level

Michael Nelson
CMES Outstanding Faculty Teaching Award

Cari Johnson
Distinguished Mentor Award (from Graduate School)

Holly Godsey (with her son) won the 2013 Utah Science Teacher Association’s Higher Education Award

William Parry (with his wife Gayle) won the Distinguished Alumnus Award from the Geology and Geophysics Department.