

Department of Geology and Geological Engineering 2016 Alumni Newsletter



Department of Geology and Geological Engineering – Fall 2016: Left to right: (back row)- Kurt Katzenstein, Chris Pellowski, Nuri Uzunlar, Larry Stetler, Darrin Pagnac, Ed Duke, Tim Masterlark, Foster Sawyer, Christina Belanger, Liangping Li, Zeynep Oner Baran (front row)- Laurie Anderson (Head), Gokce Ustunisik; Absent: Maribeth Price, Arden Davis, Colin Paterson. Alvis Lisenbee, Perry Rahn, Sally Shelton, Bill Roggenthen and Jim Fox

From the Editor – Nuri Uzunlar

Greetings Alumni and friends!

I wish each and every one of you good health and happiness in 2017. The 2016 newsletter is being produced as PDF and DOC and posted on the department's website

<http://geology.sdsmt.edu>. Alumni with emails will be notified that it is on the web page. Please pass this newsletter to other alums you may know without emails. Have a blessed holiday season!

**Department of Geology
and
Geological Engineering**

Front row, left to right: Pam Fenner, Dr. Alvis L. Lisenbee, Dr. Colin J. Paterson, Dr. Perry H. Rahn.
Middle row, left to right: Dr. James E. Fox, Dr. Paul Gries, Dr. W. M. Roggenthen, Dr. Arden D. Davis.
Back row, left to right: Dr. Jack A. Redden, Dr. H. I. Bilgesu, Dr. Ed Duke.



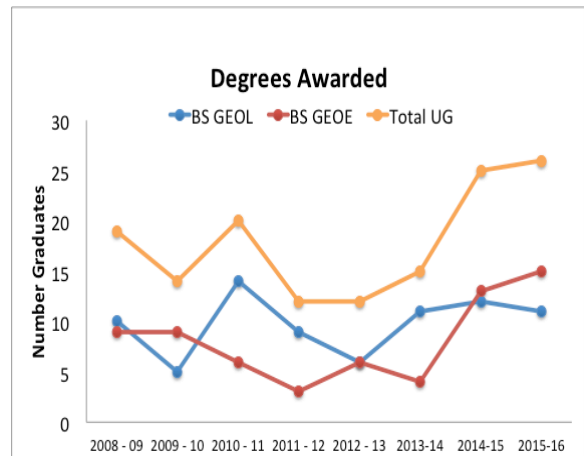
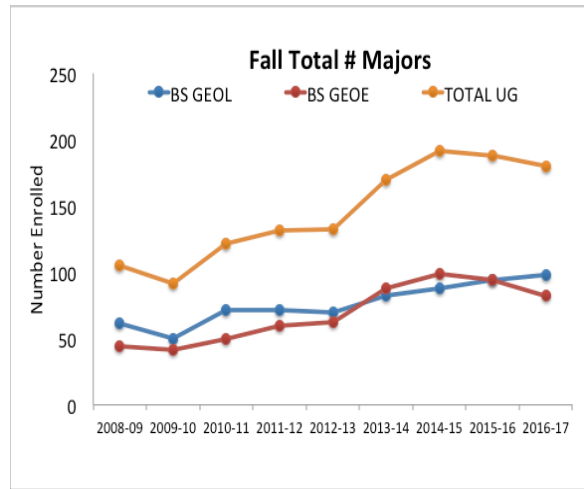
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From the Head – Laurie Anderson

Status of the Department

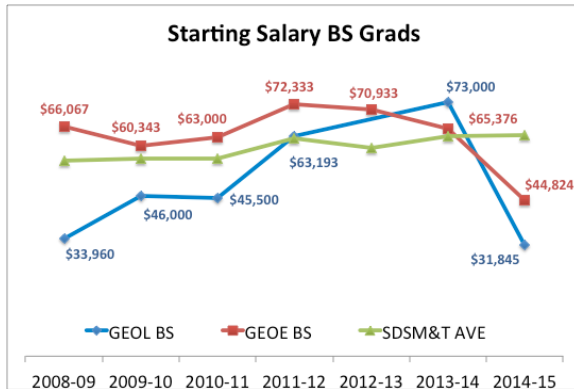
We hope your 2016 has been a great one! We are happy to say that the Department of Geology and Geological Engineering (GGE) has had another banner year. **Somewhat surprisingly, given instability in the minerals and energy sectors, the number of undergraduate majors has shown only a slight decline (~4%).** And even though the number of graduates has increased, enrollments of new freshman and transfer students have nearly kept pace. We currently have 180 GEOL and GEOE majors. In our graduate programs, we have experienced a slight increase in enrollment (currently 41), while seeing a larger number of degree completions in 2015-16 (4 MS GGE, 7 MS PALE, and 2 PhD students graduated in 2015-16).

The department’s BS program in geological engineering underwent an accreditation self-study and ABET site visit in October, along with the other engineering programs on campus. The review went well, and the geological engineering faculty are commended for their hard work in providing a quality undergraduate program.



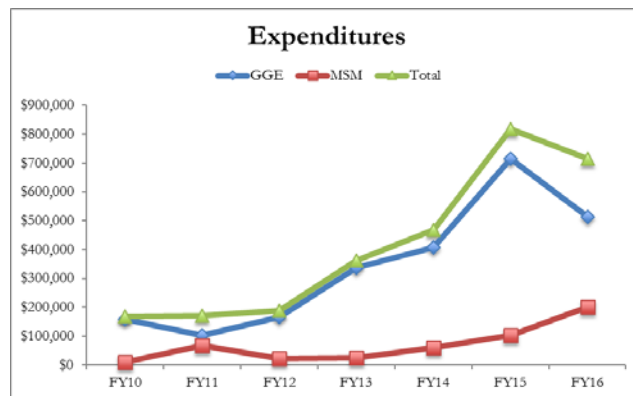
Career placement of our undergraduates has seen some effects from the downturn in the mining and petroleum industries. In 2014-15 (the latest numbers available), both GEOE and GEOL graduates had 100% placement, however, average **starting salary for both majors dropped dramatically from 2013-14**. A promising sign is that this fall we had **24 companies**

and agencies recruiting our students at the Fall Career Fair (there were 30 in 2014, 15 in 2015). We have much to do to increase the visibility of our excellent programs and students with industry at a national and international level. **We welcome any assistance that alumni and industry partners can provide in promoting SD Mines, GGE, and our students!**



*The department is continuing its efforts to establish interdisciplinary research and teaching efforts in energy resources on campus through the **Energy***

Research Initiative (ERI). In late November, we offered the directorship of ERI to an individual with expertise in both geomechanics of shales and water resource issues associated with unconventional reservoir development. we hope to have an announcement out soon of that successful hire. This initiative remains a top priority for fundraising for President Wilson and the SD Mines Foundation, with alumnus Steve O'Rourke (GEOE 1983) serving as chair of a committee to coordinate these efforts. This year we have received continued support and pledges of support from a number of alumni and industry, whose generosity will help both the department and ERI. For example, in 2016 Baker Hughes donated JewelSuite™ software for geologic modeling, reservoir engineering, 3D and 4D geomechanics, and wellbore stability, MFract™ and MShale™ software packages for fracture modeling and design, and Completion ArchiTEX™ (CTX) software for completions design. The company also donated the computers to support these software packages. The value of this gift is \$1.8 million. In addition, we received three computers from Hess that can run the versions of Schlumberger's Petrel E&P software that was donated in 2015. Further, Neuralog donated a software license this year. **These software tools are critical to our education and research efforts. At present we are looking for avenues to fund upgrades to our computer labs to use software and data donations to their fullest capacity.**



Our research efforts continue to be strong. Such awards help support both undergraduate and graduate students and provide them opportunities for research experiences in the field and laboratory. Faculty with new federal grants in 2016 include Laurie Anderson, Christina Belanger, Kurt Katzenstein, Darrin Pagnac, Maribeth Price, Bill Roggenthen, Foster Sawyer, and Larry Stetler.

We welcomed a new faculty member to the department this fall. **Dr. Gokce Ustunisik**,

who joins the geology faculty, has an expertise in experimental petrology. She comes to us from a postdoctoral position at the American Museum of Natural History. In addition, Darrin Pagnac was promoted to Associate Professor with tenure.

A number of faculty and emeritus faculty also were recognized this year. Drs. Jack Redden was inducted into the South Dakota Hall of Fame, Arden Davis was named the JP Gries Geologist of the Year, Tim Masterlark received a renewal of the John Mickelson Professorship, and Foster Sawyer received a service award from the national AIPG, was recognized as a distinguished faculty member by the Western Federation of Mineralogical and Lapidary Societies, and was awarded the SD Mines Virginia Simpson Award for community service. In addition, Alvis Lisenbee was honored by his childhood friend Peyton Yates, who donated funds to establish the Alvis Lisenbee Geology Scholarship Endowment.

We would like to acknowledge the gifts we received for the Department or the Museum of Geology (apologies for any omissions). In Fiscal Year 2016, we received \$340,894 in unendowed giving to the department and \$2,360 to the Museum of Geology, \$250,000 for newly established or additions to existing endowments for the department and \$20,000 for the Museum, and \$173,798,463 in in-kind gifts (software donations from Schlumberger, Neuralog and Baker Hughes; computer hardware from Baker Hughes and Hess). Barr Engineering has been a long-time supporter of our programs and again generously provided unrestricted funds in support of students. Whiting Petroleum, QEP, Barrick Gold, KGHM International Ltd, and Newmont Mining also continued their support of students. Frank Richardson (1955 GEOE) supported the travel of three students and one faculty member to a SPE Hydraulic Fracturing Conference. Sherwin Artus (1960 GEOE) generously continued his support of the programs in GGE and ERI. Lorin (1975 MET) and Mary Brass (1977 CE), Jeff (1978 GEOE) and Johanna Hohle, Larry Pearson (1972 ME), Willie Chiang (1981 ME), Frank Richardson (1955 GEOE), and Scott Richardson provided support for the ERI Director position. Paul (1932 MS GEOE) and Barbara Ching, Thomas Alexander (1981 MINE), and Delmar Rumph (1968 GEOE) provided support for the ERI Lab, and Dan Carlson (1866 CHEME) provided general support for this initiative. Jeff and Johanna Hohle, John Heinemann (1967 EE), Sherwin Artus and Larry Pearson provided scholarship support for students enrolled in the Petroleum Systems minor.

Other gifts were received from Kimberly Brinson (2002 GEOL), Hilary Brook (1981 GEOE, with match from Shell), Fisch Brothers Drilling, Edwin Friend (2000 GEOE), Jeanne Goodman (1979 GEOE), Dianne (1969 MATH) and Dave (1969 GEOE) Hammond, Cleo Heenan, David Kyllonen (1984 GEOE), Damon Powers (1986 GEOE), Kristina Proietti (2015 GEOE), Carl Swearingen, Thomas Wilker (1992 GEOL, with match from the Carlyle Group), Maribeth Price (using payroll deduction), and Laurie Anderson (using payroll deduction). Leroy (1971 GEOE) and Charlene Foster continued their support of the Martin Paleontology Research Lab. Andrew Farke (2003 GEOL), Jared Scofield, Sally Shelton (using payroll deduction), and Laurie Anderson (using payroll deduction) supported the Museum with their gifts.

Finally, here is a list scholarship and other award recipients to date for 2016-17. Thank you to our alumni, friends and corporate partners who are providing the funds to allow us to support and recognize our students.

Scholarship/Fellowship	Recipient(s)
D. Sherwin Artus GEOE	Todd Anderson (GEOE), Mason Marvin (GEOE), Jarek Haverluck (GEOE), Nishanthi Perera (GEOE), Max Southbloom (GEOE)
D. Sherwin Artus Petroleum Systems	Nicholas Dennis (GEOE/GEOL), Sterling Richard (GEOE), Johnathon Malone (CBE), Andrew Lee (CEE), Fleford Redoloza (GEOE)
Macy Baresch	Luke Jacob (GEOE)
Barrick Gold	Hannah Duncan (GEOL)
Jeff L. Bauer Memorial	Bobbi Strange (GEOE)
Lynn & Nancy Owen Bell	Hallie Bower (GEOL)
Carver Cornelissen	Nishanthi Perera (GEOE)
Darton Field Camp	Colton Medler (GEOL), Baylor Wagehoft (GEOE)
Homer Davis Memorial	Luke Jacob (GEOE)
Gregory French	Houston Wagner (MS GEOL)
Paul and Virginia Gries	Kelsey Barnhill (MS PALE), Broc Kokesh (MS PALE), Nicole Ridgwell (PhD GEOL), Scott Kottkamp (MS PALE), Jared Fox (GEOL), Cody Schlechter (GEOE), Devin Last (MS GEOL), Nikolas Eiden (GEOL), Sharon Sharon (PhD GEOL), Brandon Charron (GEOL), Peter Daly (GEOL), Jessica Fabin (GEOL), Dominic Krause (GEOE), Eric Schneider (GEOE), Megan Norr (MS PALE), Bailey Schwenk (GEOL), Benjamin Stec (GEOL), Brooke Long (MS PALE), Rex Tarras (GEOE), Seth Vandenberg (GEOL), Adam Vantellingen (GEOL)
Halliburton (Petroleum Field Camp)	Shelby Allen (GEOE), Kaleigh Muilenberg (GEOL), Fleford Redoloza (GEOE)
Heinemann Petroleum Systems	Padyn Huschka (ME), Andrew Lee (GEOE), Johnathon Malone (GEOE), Sterling Richard (GEOE)
Ben Holmes Memorial	Colton Medler (GEOL), Tristan Walker (GEOL)
KGHM International Ltd Scholarship	Taran Bradley (GEOL)
Dr. Ray Lemley Memorial	Tucker Loeffen (GEOE)
Alvis Lisenbee (GEOL)	Hallie Bower (GEOL)
John Mickelson Fellowship	Kyle Hazelwood (PhD GEOL)
Newmont Mining	Jason Ablott (GEOE), Monica Spoore (GEOL), Desiray Wilson (GEOL)
Jack Redden (outstanding GEOL senior)	Tait Earney (GEOL)
Roy E. Roadifer	Brittanie Wratchford (GEOL), Andrew Peitz (GEOL), Perrin Salonek (GEOE), Jacob Wicklund (GEOE)
QEP	Johnathon Malone (GEOE), Sterling Richard (GEOE), Nicholas Dennis (GEOE/GEOL), Morgan Ekmark (GEOL)

Bill & Jean Roberts	Jared Fox (GEOL)
Bill & Jean Roberts (Western Gem & Mineral Society)	
Roberts Fellowship	Scyller Borglum (PhD GEOE)
Rocky Mountain Federation of Mineralogical and Lapidary Societies	Stephanie Loose (MS GEOL), Kyle Hazelwood (PhD GEOL)
Seth Schaefer	Baylor Wagehoft (GEOE)
Tullis (outstanding GEOE senior)	Jonathan Emmer (GEOE)
Whiting Fellowships	Robert Huber (MS GEOE), Kyle Hazelwood (PhD GEOL), Shilpika Podali (MS GEOL), Cody Stock (MS GEOL), Scyller Borglum (PhD GEOE)
Whiting Petroleum Corp. Travel Awards	Scyller Borglum (PhD GEOE): SPE Russian Petroleum Technology Conference Moscow; Michael Baranowski (PhD GEOL): AGU, San Francisco; Tony Gesualdo (MS GEOL): GSA, Denver

Finally, all of the best to you for the New Year. **I hope you will think of us as part of your charitable giving plan now and in future years.** SD Mines is experiencing some budget shortfalls and we could really use the support of alumni and friends, especially at this time. **I would be happy to chat with you about the department's needs and goals at any time.**

Laurie Anderson News

My research this year involved both field work and collections work in the Museum of Geology. Work on a project funded by the NSF Dimensions of Biodiversity program with Annette Engel from the University of Tennessee - Knoxville and Barbara Campbell from Clemson University continues. This project is a field and lab investigation of the genetic, taxonomic, and functional diversity of modern lucinid bivalve chemosymbiosis from coastal marine biomes. At SD Mines, we are investigating how the morphology of the living bivalve hosts might reveal the presence of endosymbionts, degree of symbiotic dependence, or the type of symbiont dependence.

Field work in 2016 for this project included a field course in the Bahamas for SD Mines and UT Knoxville students. The course was run through the Gerace Research Station on San Salvador Island, and focused on investigating the geochemistry, sedimentology, and ecology of coastal biomes as well as their Quaternary analogs. We also conducted field work in the Florida Keys over the summer.



Brooke Long (MS PALE) completed her thesis as part of this project and is continuing on with a PhD (GEOL) with me. She presented her work comparing the morphology of live and dead *Stewartia floridana* at the Geological Society of America Meeting this fall, and is currently working on manuscripts from her MS work. In

addition, Broc Kokesh (MS PALE) joined the program this year, and participated in the Bahamas field course. His work will focus on the lucinid *Ctena orbiculara*, which is found in both coastal areas and lakes with marine conduits on San Salvador.

I also spent part of October in Brazil as part of a comprehensive survey of the free-living freshwater macrofauna of the lower Amazon basin. I was part of a team of researchers from Brazil, Canada and the US and our sampling focused on the area near Santarem, Brazil.



The PRL is busy with many undergraduate and graduate students involved in several collections projects as well as other research. In addition to projects funded by the Institute of Museum and Library Service and NSF Collections in Support of Biological Research program, we received new funding from the Bureau of Land Management to curate and rehouse the Fossil Lake (Oregon) collections, and Maribeth Price and I received funding from the NSF Advancing Digitization of Biological Collections program to digitize Cretaceous collections that USD transferred to us in 2011. Megan Norr (MS PALE) is working with me, and using western Atlantic collections to examine the morphologic response of glycymerid bivalves to a regional mass extinction in the Plio-Pleistocene.

2016 GGE Department news:

January:

Geological Society of America awards Mines student best poster

Congratulations to Brooke Long, MS PALE

<http://www.sdsmt.edu/News/Geological-Society-of-America-awards-Mines-Student-Best-Poster/>

Schlumberger Oil and Gas software gift to Mines valued at \$172 Million – Page 2

<http://www.sdsmt.edu/Campus-Services/University-Relations-and-Media/Publications/Docs/Legacy-News-January-2016/>

Dakota Midday Innovation: \$172 Million Software Donation for SD School of Mines & Technology – Drs. Foster Sawyer and Laurie Anderson

<http://listen.sdpb.org/post/dakota-midday-innovation-172-million-software-donation-sd-school-mines-technology>

February:

Capacity museum crowd hears about area geological history from Dr. Alvis Lisenbee, Professor Emeritus of Geology

http://rapidcityjournal.com/news/local/communities/belle_fourche/capacity-museum-crowd-hears-about-area-geological-history/article_11241ebb-57ad-5778-add4-fc4fe837a083.html

March:

Unearth mysteries of the past at SD Mines Dinosaur Extravaganza

<http://www.sdsmt.edu/News/Unearth-Mysteries-of-the-Past-at-SD-Mines-Dinosaur-Extravaganza/>

April:

Intern Spotlight: Kayleigh Muilenburg, BS GEOL in Legacy News – April, Page 8

<http://www.sdsmt.edu/Campus-Services/University-Relations-and-Media/Publications/Docs/Legacy-News-April-2016/>

New \$10K scholarship honors professor, Black Hills researcher
Congratulations to Hallie Bower, BS GEOL, as the first recipient

[http://www.sdsmt.edu/News/New-\\$10,000-Scholarship-Honors-Professor,-Black-Hills-Researcher/](http://www.sdsmt.edu/News/New-$10,000-Scholarship-Honors-Professor,-Black-Hills-Researcher/)

Mines conducts hands-on geology event at Valley View Elementary

<http://www.sdsmt.edu/News/Mines-Conducts-Hands-on-Geology-Event-at-Valley-View-Elementary/>

SD Mines alumnus David LaPorte named 2016 Fulbright Scholar

<http://www.sdsmt.edu/News/SD-Mines-Alumnus-David-LaPorte-Named-2016-Fulbright-Scholar/>

SD Mines geology professor selected as 2016 honorary award recipient out of nominees from 12 states

<http://www.sdsmt.edu/News/Mines-Geology-Professor-Selected-as-2016-Honorary-Award-Recipient-out-of-Nominees-from-12-States/>

Undergraduate, graduate student researchers awarded

Congratulations to our undergraduate students Tait Earney, Laura Rochlitz and James Mishoulam

<http://www.sdsmt.edu/News/Undergraduate,-Graduate-Student-Researchers-Awarded/>

SD Mines start-up wins Governor's Giant Vision student competition

Congratulations to Scyller Borglum, Ph.D. candidate in Geological Engineering

<http://www.sdsmt.edu/News/SD-Mines-Start-up-Wins-Governor-s-Giant-Vision-Student-Competition/>

Dinos at Mines thrill children of the Hills

http://rapidcityjournal.com/news/local/dinos-at-mines-thrill-children-of-the-hills/article_eec4d1df-72a1-5222-80df-12c8bb6f041d.html

May:

2016 Employee Service awards - Dr. J. Foster Sawyer, Associate Professor of Geological Engineering, received the Virginia Simpson Award



Dr. Arden Davis, Professor Emeritus of Geological Engineering, named 2016 J. P. Gries Geologist of the Year

<http://www.sdsmt.edu/News/Mines-Professor-Emeritus-Named-2016-J-P--Gries-Geologist-of-the-Year/>

Dr. Jack Redden, Professor Emeritus of Geology, inducted into the South Dakota Hall of Fame

http://rapidcityjournal.com/news/local/three-west-river-residents-to-be-enshrined-in-sd-hall/article_476c8000-6da1-5234-bafe-94fad9987f07.html

http://sdexcellence.org/Jack_Redden

June:

South Dakota's forgotten national monument: A cautionary tale for the Park Service centennial

http://rapidcityjournal.com/news/local/sd-s-forgotten-national-monument-a-cautionary-tale-for-the/article_94f03f22-1c00-54bc-b73a-df4c737f337c.html

July:

Enduring boyhood friendship leads to generous Lisenbee scholarship in the Hardrock – page 6

http://issuu.com/gotomines/docs/sdsmt_hardrock_summer-2016/9?e=1022375/38230239

September:

Mines student selected for NAGT-USGS field training program

<http://www.sdsmt.edu/News/Mines-Student-Selected-for-NAGT-USGS-Field-Training-Program/>

Geologist Sawyer honored with prestigious national award

<http://www.sdsmt.edu/News/Geologist-Sawyer-Honored-with-Prestigious-National-Award/>

Retired Hermosa rancher now focuses on fossil-hunting hobby

<http://www.keloland.com/news/article/news/retired-hermosa-rancher-now-focuses-on-fossil-hunting-hobby>

Rare mammoth fossil surprises experts – Justin Wilkins, MS PALE

<http://www.usatoday.com/story/news/nation-now/2016/09/14/rare-mammoth-fossil-found/90380490/>

October:

Fossil history attracts paleontologists in South Dakota

http://rapidcityjournal.com/news/local/fossil-history-attracts-paleontologists-in-south-dakota/article_55908b0e-aff3-5500-be94-ccc56ebc5645.html

Oilfield services giant Baker Hughes donates \$1.8M in industry software

[http://www.sdsmt.edu/News/Oilfield-Services-Giant-Baker-Hughes-Donates-\\$1-8M-in-Industry-Software/](http://www.sdsmt.edu/News/Oilfield-Services-Giant-Baker-Hughes-Donates-$1-8M-in-Industry-Software/)

Public invited to bring rocks, fossils to museum

http://rapidcityjournal.com/news/local/public-invited-to-bring-rocks-fossils-to-museum/article_e081d249-b4f1-59d3-a273-adc823043363.html

‘Night at the Museum’ hosted at SD Mines October 29th

<http://www.sdsmt.edu/News/Night-at-the-Museum-Features-Trick-or-Treating-with-the-Dinosaurs/>

Christopher Pellowski

It was a busy year at Ranch A with three five-week sessions being offered this past summer. During the three five-week sessions, we had 28 students from 13 universities in session one, 30 students from 15 universities in session two and 27 students from 17 universities in session three. The weather started off cool for session one and by the first week of session three, the students and instructors were greeted with and worked in triple-digit temperatures!



Session 1, 2016 students and instructors

The counselors from Admissions have once again invited our department to join them for recruitment visits to Central and Saint Thomas More Schools so far this year to promote our programs. We loaded up the sediment flume and packed up some mineral and fossil specimens to display and handed out our undergraduate degree brochures to interested students. We were also invited by Admissions to visit North Middle School's career fair on November 9th to help the students better understand what geologists, geological engineers and paleontologist do each day and why this could be one of their career choices in the future.



Central High School students learning about the formation of stream channels and sediment transport. Photo by Ms. Brittany Lystad, Admissions

I taught the GeolE 451 Economic Geology class in the spring semester with 14 students enrolled. The Mineral Venture exploration game was the highlight of the semester with four student groups applying their newly acquired knowledge exploring for the next major Zambian copper deposit. The students enjoyed having a real-world mineral exploration simulation as part of their education and training.



GeolE 451 Economic Geology students collected ore samples in the Deep Portland pit at the Wharf gold mine (owned by Coeur Mining) during a field trip on April 13th.

This year I am serving on three department committees and will be teaching GEOL 351 Earth Resources and the Environment during the Spring 2017 semester with 27 students already signed up.

Be sure to visit and like us on Facebook.



<https://www.facebook.com/SDSMTGeologyGeologicalEngineering>

From Our Emeritus Professors:

Colin Paterson

I spent January through April in Te Anau, New Zealand, and came back to co-teach the 5-week geology field camp at Ranch A this summer. Rachel (Pate) Haley successfully defended her MS thesis in October on “Gabbroic Intrusions at Wakonda, Clay County, South Dakota: What is their Potential for Ni-Cu and/or PGE Mineralization?” I was on the committee for Tony Gesualdo’s MS thesis on “Structural Controls on Mineralization and Fault Reactivation at Marigold Mine, Humboldt County, Nevada”, and he defended successfully in November.

The **Society of Economic Geologists student chapter**, headed by Tony Gesualdo, continues to be very active in the department with about 20 members involved in monthly meetings, field trips, outreach activities, and sponsoring of refreshments for the department seminars. I accompanied four students (sophomore to graduate) on the SEG-sponsored trip in August 2016, in association with the Univ. Nevada-Reno chapter, to the Lucky Friday Ag-Pb mine in Mullan (ID) and the Emerald Creek alluvial garnet mine near Fernwood (ID). In October, we hosted Dr Jeremy Richards (Univ. of Alberta), SEG Thayer Lindsley Visiting Lecturer – he presented two talks, one on “Writing a Scientific Paper”, and the other on “**Porphyry and Epithermal Ore Formation in Post-subduction Tectonic Settings**”.

Becci’s daughter, Aryn Rowe (BS Geol 2010) became a co-owner of a start-up alluvial gold mine (North Star) near Eureka, central Alaska. We took 2 trips there this summer to assess the geological controls. I presented a talk on the mine operations to the SEG chapter in November.

I presented a talk to the Darton Geological Society in October on ” A City Shaken (again): The 2010-11 Earthquakes of Christchurch, New Zealand”, and gave an update at the November 14 meeting the day after more major quakes hit the area from Christchurch to Wellington.

If any of you are in New Zealand or intending to travel there, email me – Becci and I will be based in our summer residence in Te Anau, gateway to Fiordland National Park in the southwest of the South Island, during January-April 2017. Our home is available as a vacation rental outside those months –google “Mountain Vista on Matai”. If you are interested in geological/cultural tours of New Zealand during January-April, email me.



SDSM&T and UNR SEG students at Lucky Friday



On the garnet stockpile at Emerald Creek garnet mine

Arden D. Davis

Professor Emeritus of Geological Engineering

After retiring in June of 2015, I've been sharing an office with Dr. Perry Rahn in MI 327B. The large number of books and papers Perry and I have accumulated are spilling over into bookcases outside our inner office but they still are useful, especially for guest lectures and for research.

During the past year I've continued to work with a company that several faculty members at SDSMT formed as a commercial entity for removal of arsenic and heavy metals from water. The company has grown and has gained some additional owners and investors. The method we've developed is especially effective for removing lead and cadmium, in addition to arsenic and some other contaminants. The company, CalxAqua, hopes to sell full-scale units for water treatment facilities and cartridges for under-sink household use. We also hope to treat mine drainage water at active mines and at inactive facilities, including Superfund sites. Currently we have a pilot plant at a small community water supply in the northern Black Hills. Some of the other owners of CalxAqua include Dr. David Dixon (Chemical Engineering), Dr. Cathleen Webb (formerly in the Chemistry Department, now Department Head and Associate Dean at Western Kentucky University), and Dr. Jenifer Sorensen (Minnesota Department of Natural Resources).

Along with Dr. Alvis Lisenbee and Dr. Maribeth Price, I continued to work last year on research that examined water quality of Precambrian aquifers in the central and southern Black Hills, especially in the Hill City, Keystone, and Custer areas. We've found a surprising number of private wells with arsenic concentrations above the maximum contaminant level of 0.010 mg/L. Because these are private wells rather than public water supplies, they aren't subject to state enforcement action, but we've urged well owners to check with the South Dakota Department of Environment and Natural Resources to learn about alternatives and treatment options. We hope that one of the results of our work will be a detailed water atlas.

As we like to do each summer, my wife and I spent about 2 ½ months at our farmstead in Minnesota. Before leaving in late August we were able to enjoy sweet corn and green beans from the garden. We also had the most apples the trees have ever borne, and the apples were

large – summer apples (Yellow Transparent and Lodi), as well as McIntosh, Wealthy, Prairie Spy, Northwestern Greening, and Macoun. Maybe next year I should spray them.

I've continued to do some occasional consulting work during the past year. It also was enjoyable to visit with graduates and Professional Advisory Board members, including Jeanne Goodman, Ken Buhler, Roberta (Fivecoate) Hudson, Kathleen Grigg, Syed Nayyer, Laura (Gronewold) Newman, Mike DeFea, Carolyn (Westre) Trautman, Janet Carter, Joshua Valder, Bill Eldridge, Kyle Davis, Stuart Buchholz, Richard Arnold, Ray Wuolo, David Hammond, Sherwin Artus, Steve O'Rourke, Ahmad Ghassemi, Tom Bidgood, David LaPorte, Chance Costello, Mike Mahowald, Susan Ray, Erik Smith, Erik Walega, Dennis Riding, Jonathan McKaskey, Karl Koth, Brad Stock, Matt Minnick, Jennifer Bednar, Steve Mezger, Neal Olmstead, Victoria Bierwirth, and many others – my apologies if I've left anyone's name off.

Please stop by and visit if you're in the area.

From the Faculty:

Larry Stetler

In 2016 I taught 3 courses in the spring term, 2 course in the summer, and 2 courses in the fall semester. Currently I am advisor for 2 MS GeoE students (1 graduating in Dec 2016), 2 PhD GeoE students, and 1 PhD Geol student. One paper is currently in review and two others are in preparation for submission early in 2017.

Research in 2016 was focused primarily on the DoE Deep Borehole Field Test proposal, which was rejected in May 2016. We have recently re-submitted to that project. All of my students are conducting research and I am involved with them. Both MS students are working for the SD USGS office in Rapid City on groundwater modeling projects. My PhD students are conducting research on rock mechanics (fracturing in shale), environmental issues (exact project yet to be defined), and geomorphology (landform evolution of the Black Hills).

Liangping Li

Hello, Alumni and friends. In 2016, I taught Groundwater course that is offered in both spring and fall semesters for undergrad student, and I also offered Advanced Groundwater course in the fall semester for graduate student. We had substantial improvements for these courses in terms of equipment and software with the support of department and my start-up. Specifically, a groundwater model was purchased for introducing the basic concepts in groundwater and can also be used in student recruitment; a new data logger was added for using in pumping and slug tests; and a groundwater modeling software (GMS) with unlimited number of student licenses was purchased and can be used for both teaching and research.

Regarding research, my proposal entitled "Developing a Novel Tool for Production Data Inversion Using Multiple-Point Geostatistics in Oil Reservoir Modeling" was funded by SDSMT's Nelson Research Grant. Currently, an undergrad student is funded from this project.

One research article is published in *Water* journal this year, which described a new method for groundwater level mapping using multiple-point geostatistics. I also attended 10th international geostatistical congress in Spain, in which I chaired the hydrogeology session and gave an oral presentation and a poster. An abstract about land subsidence modeling using drawdown and surface deformation data also is accepted and will be presented in the AGU fall meeting in December. As an associate editor for two international journals, I continued to organize peer reviews for research articles in my field. I also served on the scientific committee for two international conferences (GEOSTAT 2016 in Spain and IAMG 2017 in Australia). I was nominated by Dr. Gomez-Hernandez for Water Young Investigator Award.

Kurt Katzenstein

The end of another busy year is upon us! I hope you and your family had a happy and fruitful year. As usual, I was busy both at home and here at SDSM&T. We now have two daughters in elementary school (Brianne – 7 in first grade, and Hannah – 5 in Kindergarten), as well as our youngest, Leslie (3) who is growing up way too fast. This year we have enjoyed a myriad of activities with our girls including soccer, basketball, hiking, camping, visiting with friends and family, and general misbehavior around the house! It is an amazing thing to watch these kiddos grow up and I just wish it would slow down a bit!



The “Geology Rocks” youth camp was revived this year after a brief hiatus during 2015. In mid-July I organized the camp for 24 high-school students and we were blessed with perfect weather in which to enjoy the geologic splendor of the Black Hills. The experience was a positive for everyone!



It was another good year for the Tech Geological Association as well. This year we hosted the annual fall department kickoff party, the annual ice fishing pot-luck at Sheridan Lake, climbed ~~Harney~~ Black Elk Peak (as you may have heard, the name was changed this year and we were there the day it officially changed!), took a tour of Wind Cave, went agate hunting and hosted four bowling nights. I was lucky enough to once again accompany SDSM&T Admissions to multiple high schools with our sediment flume to recruit students. I also took three students to the Hydraulic Fracturing Technology Conference in Houston, TX (thanks to a generous donation from a GEOE alum).



As you may know, the GEOE program underwent successful ABET accreditation this Fall. This was a herculean effort and I would like to personally thank the employers and alumni who responded to our surveys which provided valuable information for our accreditation effort. In May I completed ABET Program Evaluator Training so I will be evaluating other GEOE programs moving forward.

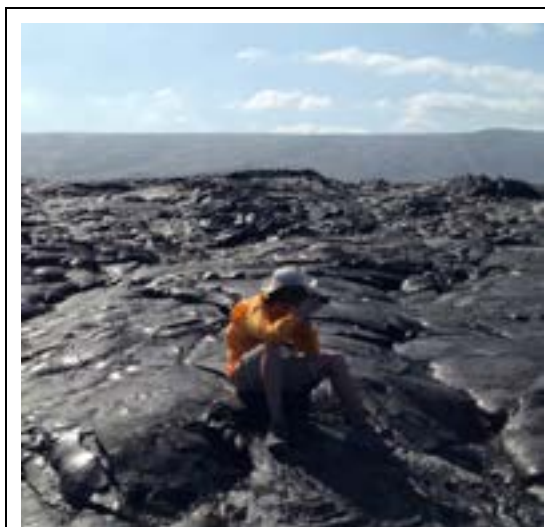
I participated in research associated with four funded projects this year. We are on our third year of a major (\$1,250,000) grant to investigate complex ventilation in block-caving mining operations. This project graduated two M.S. students this year and is currently funding an additional 3 M.S. and 1 Ph. D. student. In another funded project, we are acquiring a piece of testing equipment for precise measurements of strain on a myriad of materials using optical techniques. We finished our work on a three-year NSF grant investigating deformation resulting from volcanic intrusions. I also recently secured funding to investigate land subsidence that is causing harmful distress to a housing development in an arid valley in the western US (the exact location is confidential at this point).

I hope that you have enjoyed 2016 and that you are looking forward to 2017 as much as I am.

Tim Masterlark

2016 was a remarkably challenging year for me. On the personal side, I embarked on life as a single parent. This presents the unique challenge of resisting pressure from my son, Jack, who wants to turn our house into a man-cave that is filled with a variety of exotic pets and remote controlled devices. I registered to compete in the 75th Bataan Memorial Death March -26 miles of high desert and pure grit. I train by spending my weekends hauling a sandbag around the Black Hills and Badlands. If all goes as planned, I will see you on the other side.

The challenges on the professional side are much more linear. Congratulations to Ted Donovan for successfully defending his dissertation! He is on-track to begin as a post-doc researcher, funded by NASA JPL, in my research team in Spring 2017. Dr. Caihong Zhang (Research Fellow from the Institute of Seismology, China Earthquake Administration) is joining my research team in December 2016 for a year-long visit that is sponsored by the China Scholarship Council. She will construct numerical models of earthquake deformation for a variety of targets in China. Dr. Jay Tung will continue as a post-doc researcher in my research team for the next few years, thanks to a newly-awarded grant from the NASA Earth Surface and Interior Program. Jay, Mike Baranowski (PhD student), and I will represent our research team with multiple presentations at the AGU Fall Meeting 2016. Mike will present preliminary thermal models for the Krafla Magma Testbed, Iceland. Jared Fox (UG student) began working with Project Firewalker (remotely-operated tracked rover with geophysical instrumentation) and is serving as a liaison between my research team and robotics students from Stevens High School. Finally, I welcome Stephanie Loose (MS student) to my research team. Stephanie's field orientation is a unique component of my research team. In 2016, my team published two articles in the prestigious *Journal of Geophysical Research*:



Jack Masterlark photographing lava breakouts of age zero, near the ocean entry on the east flank of Pu'u Ō'ō (pronounced "poo oo oh oh") on the Big Island of Hawaii.

Tung, S., T. Masterlark, and T. Donovan (2016), Coseismic slip distribution of the 2015 Mw7.8 Gorkha Earthquake from joint inversion of GPS and InSAR data for slip within a 3D heterogeneous domain, *Journal of Geophysical Research*, doi:10.1002/2015JB012497, 25pp.

Masterlark, T., T. Donovan, K.L. Feigl, M. Haney, C. Thurber, and S. Tung (2016), Volcano deformation source parameters estimated from InSAR: Sensitivities to uncertainties in seismic tomography, *Journal of Geophysical Research*, doi:10.1002/2015JB012656, 17pp.

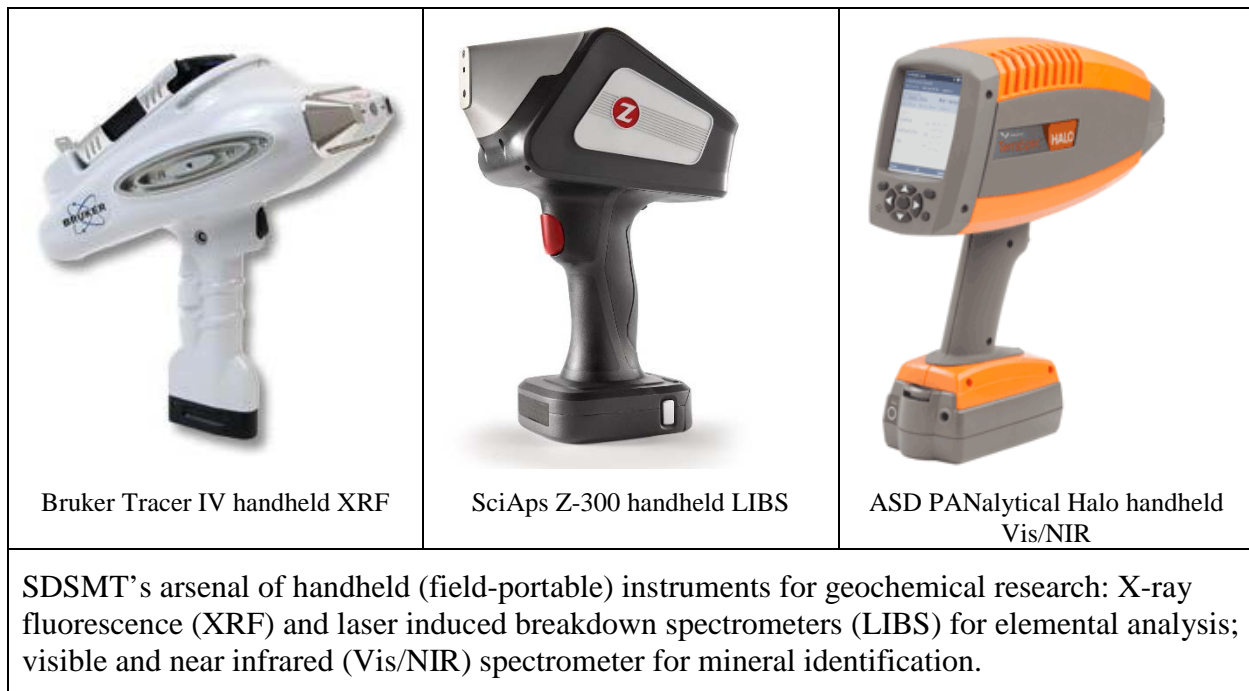
And we have manuscripts submitted to *Geophysical Journal International* and *Computers & Geoscience*:

Ronchin, E., T. Masterlark, J. Dawson, S. Saunders, and J. Marti Molist (2016), Imaging a free geometry magma reservoir using FEM-based linear inverse modeling of InSAR Data: Application to Rabaul Caldera, Papua New Guinea, *Geophysical Journal International* (Manuscript No. GJI-S-16-0461, in review).

Donovan, T., T. Masterlark, and S. Tung (2016), Automation Techniques for Evaluating FEMs of Volcano Deformation for Heterogeneous Elastic Domains, *Computers & Geoscience* (Manuscript No. CAGEO-D-16-00083, in review)

Ed Duke

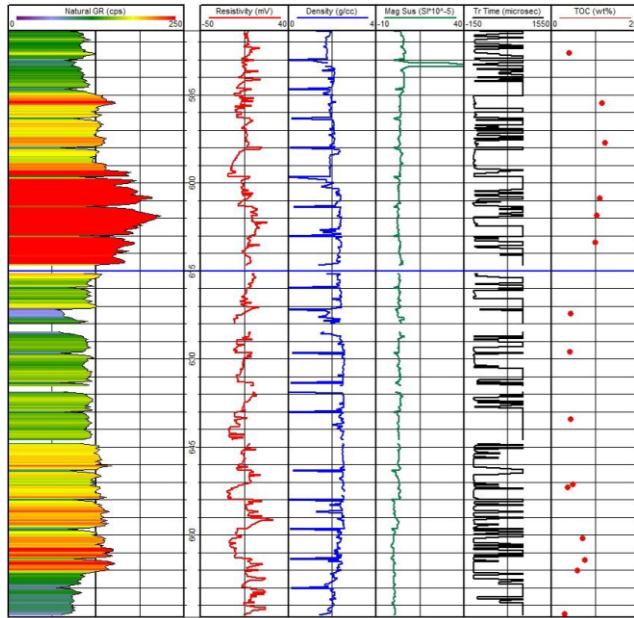
This year Ed Duke taught two courses in the department: Mineralogy and Crystallography, and Scanning Electron Microscopy. The department welcomed Gokce Ustunisik this fall as the new petrology specialist, and she immediately took over teaching of Igneous and Metamorphic Petrology. Ed continues his duties as Director of the Engineering and Mining Experiment Station (EMES) and Director of the South Dakota Space Grant Consortium and South Dakota NASA EPSCoR Program. He has also enjoyed working with several Geology undergraduate students on senior research and independent research projects that test applications of EMES's handheld spectrometers for field-based geochemistry and mineralogy. Taran Bradley and Michael Day have been using visible and near infrared spectroscopy to map regional variation in muscovite composition in low- to medium-grade metamorphic rocks (biotite and garnet zones) in the central and northern Black Hills. This fall, Mike began his MS program in which he is continuing the spectroscopy research. In addition, senior Matt Johnson is investigating use of a new laser induced breakdown spectrometer to perform field geochemical analysis of mudrocks and ash deposits and senior Brett Wetrosky is using a portable X-ray fluorescence spectrometer to look for possible element dispersion around ore-bearing verticals at Coeur Mining's Wharf gold deposit.



Foster Sawyer

Greetings alumni, students, and friends of the Department of Geology & Geological Engineering! 2016 was another busy and exciting year around the Department and campus. Highlights for me include securing funding for an additional three-year cycle of the NSF PEEC program, receiving a new grant award from the Bureau of Indian Affairs to work with the Rosebud Sioux Tribe on energy related activities, contributing to a book on the PEEC program at the national level, and successful evaluation of our geological engineering program through the

ABET evaluation process. As always, teaching classes and labs, advising students, and working with the Tech Geological Society and the Student Chapter of the Society of Petroleum Engineers are interesting, challenging, and rewarding components of my work.



A.



B.

A. Geophysical log data from a U.S. Department of Energy technical report currently in press. B. Students participate in a field trip to a Whiting Petroleum Corporation drill site in northeastern Colorado.

Collaborative activities with Tribal colleges and agencies remain strong, with a new three-year cycle of the PEEC program (titled PEEC II) beginning in fall 2016, and a new grant funded by the U.S. Bureau of Indian Affairs to explore natural gas alternatives with the Rosebud Tribe. Information on previous activities, successes, and challenges associated with the PEEC program (nationally) are currently being published as a comprehensive book, and our PEEC partners at South Dakota State University took the lead in coordinating and spearheading that effort. Other products resulting from Tribal initiatives include a technical report through the U.S. Department of Energy that is being coauthored by National Energy Technical Laboratory personnel and SDSM&T participants, and a thesis on the Niobrara Formation at the Rosebud Reservation that was recently completed by Ms. Amy Freye.

The level of activity around the department also remains high, with many meetings, field trips, and social events sponsored by the Student Chapter of the Society of Petroleum Engineers and the Tech Geological Association (the student organizations that I advise and co-advise, respectively). Another departmental activity that required considerable time and effort by the Geological Engineering faculty over the past year(s) was completion of our ABET assessment for the geological engineering program. Thanks to the hard work and excellent preparation by all of the faculty involved (including both geological engineering and geology faculty), we passed our evaluation with flying colors. Particular thanks go to Larry Stetler and Kurt Katzenstein who led the charge in developing our approach and designing and completing our documents for the evaluation. Speaking of department activities, I should also mention that we had our second Petroleum Field camp last summer, and it was outstanding. Sincere thanks go to Steve

O'Rourke, Scott Cooper, Brian Stambaugh, and Dan Soeder for their tremendous contributions to make this field camp a success.

Finally, I would like to humbly acknowledge three awards that I was fortunate enough to receive over the past year, and to thank those who were responsible for providing the nominations. The awards are as follows:

Honorary Award, Rocky Mountain Federation of Mineralogical and Lapidary Societies

Virginia Simpson Award, South Dakota School of Mines & Technology

Martin Van Couvering Memorial Award, American Institute of Professional Geologists

I would also like to thank the American Institute of Professional Geologists (AIPG) for the opportunity to both lead and serve that organization as a national officer for the past seven years. I wish everyone Happy Holidays and a successful, healthy year in 2017!

Sincerely,

Foster

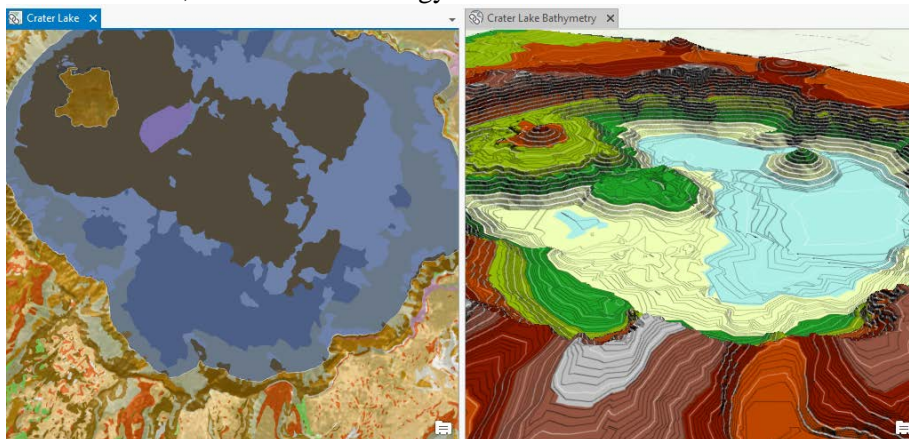
Maribeth Price

Hello all!

I am enjoying my first sabbatical after 21 years, extending the entire 2016-2017 academic year. Although I remain in Rapid City, I am working on several projects, and it is a blessing to have the ability to focus on fewer things at a time! My main project is a substantial revision of my textbook, *Mastering ArcGIS*, for the new GIS desktop application from ESRI, ArcGIS Pro, which I expect will be published in the fall. The second is continuing to work with undergraduate students Julie Manders and Madigan Cochran-Bjerke, and graduate students Nicole Ridgwell and Tyler Schlotterbeck, on 3D modeling applications in paleontology. We are testing methodologies for incorporating imaging in the curation workflow and determining the reliability of morphometric measurements made using 3D models as compared to the actual specimens. The third project is to ramp up cataloging efforts on the map collection in the Museum of Geology; some work-study students have been helping make slow but persistent headway.

Happy Holidays to everyone and have a great 2017!

Maribeth Price, Professor of Geology



Exercise from an ArcGIS Pro visualization tutorial in the new text, showing linked 2D and 3D displays of geology and bathymetry from Crater Lake, Oregon.

Zeynep Oner Baran

First of all, I wish you all have a merry Christmas and happy new year! This passing year, 2016 will be always remembered as a beautiful twist in our fate because we finally became a real family with addition of our cute, little bundle of happiness, Altan Poyraz on December 4th. While grading assignments and revising my 4 senior research students' presentations on the late night of December 3th, 9-month-long wait came to its end and the next day our son born while my students were presenting their completed senior research projects. So, I can confidently say it was a productive year!

This year, I worked with 4 Geology BS students on different projects. Douglas Sayer investigated the origin and kinematics of normal faulting in Reva Gap, SD. Tait Earney has worked on rock samples collected from Reva Gap to document occurrences of hazardous erionite minerals. Laura Rochlitz studied extremely high indoor radon measurements and their potential sources in Rapid City and surrounding areas. Finally, Michael Day used well logs and seismic data from Gulf of Mexico to test different hypotheses on occurrence of hydrocarbons relative to salt diapirs. Their final results were really exciting and we wanted to share our results at the Geological Society of America (GSA) Annual Meeting in Denver, CO.

I have submitted total 6 abstracts to GSA meeting this year, coauthored with my students on 4 of them. Tait Earney and Laura Rochlitz gave oral presentations and answered all of the questions confidently and correctly. I have chaired a technical session titled "economic geology of the extensional terrains" with Dr. Alvis Lisenbee at the GSA Annual meeting. Our session turned out to be a great success with approximately %95 participation at the peak time. Two major publisher companies are interested in publishing our session in a book or special issue format.

My MS student, Anthony Gesualdo gave a talk and presented his MS thesis project results in our technical session. He has successfully passed his final defense and completed his MS studies at SDSMT. Tony also received a job offer from Barrick Gold and he will start his new position in January, 2017. I am excited to join him at the graduation commencement on December 17! Last December, I had surprised my first MS student, Ethan Melville with showing up at the commencement only 10-12 days after my surgery. I think this year's surprise is also ready.

My other MS student, Shilpika Podali has completed her internship at Juneau Energy over the summer and she received data from the company for her MS thesis project which will investigate structural architecture of 2 claim blocks within Delaware Basin. She is our new AAPG Student Chapter president and very excited to take AAPG Chapter to the next level. Our students would like to participate at AAPG IBA (Imperial Barrel Award) Competition this year. As soon as we find one more team member to fulfill requirements, we will send out our application.

I have taught structural geology, advanced structural geology, geotectonics, and basin analysis classes this year. After attending NAGT workshop titled "Early Career Faculty: Teaching, Research and Managing your Career" at University of Maryland last summer and learning different teaching methods, I have revised all of my course material and updated my teaching methods. One new paper will be published in Tectonophysics and I am currently working on two more manuscripts. I am hoping to have a good, productive and fun year in 2017 and I wish 2017 brings you all health, peace and happiness.

Darrin Pagnac

Greetings and Happy Holidays! 2016 was an exceptionally busy, but very, very productive year for my students and me.

The biggest news is that as of May 2016 I was awarded tenure and promoted from Assistant to Associate Professor. It was a long road to get to this point, and I'd like to thank all the mentors, students, and colleagues who made this possible. I foresee great things for my students and collaborators in the future.

Field paleontology camps were not as highly attended this summer, but nonetheless we still got a great deal accomplished. August was spent, as always, along the Missouri River/Lake Francis Case conducting survey work for our U.S. Army Corps of Engineer collaborators. Two students attended camp as well as our new preparator, Kelsie Abrams. Over eighteen miles of shoreline were surveyed this year, with sixty significant specimens documented over four weeks. Students learned valuable field skills, including documentation of finds, map reading (both digital and paper), stratigraphy of the Pierre Shale, and most importantly, how to properly deal with bureaucracy after hitting a deer with a State vehicle.



The Missouri River on an exceedingly calm and muggy August morning.

My students and I were productive on the publication front this year. My Master's student, Alysia Korn, graduated in May after completing her study of concretion formation in mosasaurs. Watch for the results of her research in an upcoming publication of the journal *Palaios*. I published another paper with colleagues on the early spread of C4 grasses in southern California as evidenced by isotope signatures in fossil horse tooth enamel. Kelsie Abrams and I also presented a poster at the annual Society of Vertebrate Paleontology meeting on a mosasaur specimen with a severely injured right shoulder.

My most exciting news in the initiation of a new three-year NSF project with collaborators from eight other institutions. The project is entitled F.I.E.L.D., or Fieldwork Inspiring Expanded Leadership and Diversity. My colleagues and I will be investigating the nature of field work in the geosciences, and specifically what aspects of field activity may be difficult for

underrepresented groups, including female geoscientists, racial minorities, or individuals with disabilities. Our goal is to make field work more accessible to everyone; the field is an aspect of the geosciences that should fill everyone with wonder. I hope to make this wonder accessible to all who wish to participate.

More field paleontology camps scheduled for summer 2017. We'll be heading up to North Dakota to work with a colleague on some prospecting in Oligocene sediments near Dickinson. Also out on the Missouri River as usual in August.

Best wishes for 2017!

From Black Hills Natural Sciences Field Station and Nuri Uzunlar:

In summer of 2016 was another record year for the field Station. 302 students from 104 institutions across the USA mapped geological environments ranging from volcanoes to fault zones in Hawaii, Turkey, Iceland, Nepal, India, Ecuador, the Galapagos Islands, and the Black Hills of South Dakota. We are getting ready for the winter camps in Arizona and Death Valley. Both camps will start after Christmas. Today, the BHNSFS is the world's largest field school offering summer and winter camps in earth science and related engineering fields including geology, geological engineering, environmental geology and engineering, volcanology, geomorphology and geo-hazards on four continents.

In June, Alvis and I spent five weeks in Turkey teaching field camp as we have been doing for 13 years. Late July, I joined the Hawaii camp lead by Tim Masterlark. We spent three weeks on the big island studying lavas in Kilauea National Park, Mauna Loa and Mauna Kea with 19 students.

Newly established Spain (18 students) and Montana (27 students) camps were great success.



In addition to traveling from camp to camp I have been very active in departmental committees and the department's graduate recruiting efforts. I attended GSA in Denver and AGU in San Francisco, where the field station and the department had an exhibit.



Mapping in the Black Hills

The BHNSFS is growing every year and lodging is becoming a serious issue. I am looking for a suitable land somewhere close to Nemo or Spearfish to build a field station. Please contact me if you can help or you know someone who can.

For additional information about upcoming field station activities please visit:

<http://geologyfieldcamp.sdsmt.edu>, call me at (605) 394-2494 or write to nuri.uzunlar@sdsmt.edu