SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY

2011 Alumni Newsletter

Department of Geology and Geological Engineering

Department of Geology and Geological Engineering – Fall 2009: Left to right: (back row) – Colin Paterson, Foster Sawyer, Jim Martin, Ed Duke, Maribeth Price (chair) and Mike Terry; Front row) – Larry Stetler, Perry Rahn, Kurt Katzenstein, Arden Davis and Nuri Uzunlar; Absent: Alvis Lisenbee, Bill Roggenthen, Jim Fox, Jack Redden, Darrin Pagnac, Sally Shelton and Aaron Wood.

From the Editor – Nuri Uzunlar

The 2011 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 great year!

From the Chair - Maribeth Price

Greetings to all! I hope that the new year finds you happy and healthy!

Another action-packed year is well on its way. We were pleased to welcome over 40 new freshmen and transfer students to our department this year, including 18 in geological engineering and 25 in geology/paleontology . Enrollments all over campus are up, thanks to new blood and ideas in the admissions office. They are doing a great job. The introductory courses are packed, with over 70 in Geology for Engineers. It is great to see all the new faces.

This year we are continuing a national search for a department head, who will have a light teaching load and a charge to help the department grow in enrollments, research, and industry relations. We had some good candidates last year but were unable to find the right match. We seek the help of all alumni to help us find good candidates for this important position. We are also searching for an assistant professor in geological engineering to fill the position vacated by Dr. Roggenthen to take on his role of research scientist at the Sanford Underground Science and Engineering Laboratory (SUSEL) at Homestake. Our goal is to leverage that position into two new faculty with lighter teaching loads and more research support, a new model for growth promoted by the Provost and President. The plan is to hire one this year and one next year.

In paleontology, we welcome Dr. Darrin Pagnac as a new Assistant Professor and Dr. Aaron Wood, previously of the University of Michigan, as the new Haslem Postdoc. They have moved into their offices in the new Paleontology Research Center building. It is open for business, after a hectic summer of inventory and moving. Indeed, that job is nowhere near complete, but the new building is absolutely fantastic. If you are in Rapid City, be sure to stop by and ask for a tour!

Thanks to all who have contributed to the department and scholarships this year. Your generosity helps our students and becomes a part of all the exciting events and initiatives that are leading us into the future. We appreciate your support very much!

See next page for senior research notes:

Senior Research Projects 2010-2011

These research projects have been proposed by the seniors this year and they will be working to complete them by May. The students would like to thank the alumni who have donated to the department in recent years. Some of these funds are used to help these students pay for costs associated with their research projects.

Laura Clarke, A comparison of Green River and Florissant insect assemblages and their paleoclimatic implications

Samantha Cohen, Beaver Creek Pleistocene Microfauna

Thomas J. Hayden, The preparation, identification and correlation of a recently discovered Mosasaur

Sarah Knight, Taxonomy of a *Trionyx* specimen from the Chadron Formation, Hermosa, SD

Leah Koch, Fabric strength in amphibolites and implications for seismic anisotropy in the Deep Underground Science and Engineering Lab

Kelvin Krause, Evaluation of mechanical fossil matrix preparation systems

Janine LeRoy, Deciphering ecological variables discriminated by MODIS multi-temporal classification of rangeland

Cynthia Peterson, Astragalus changes in prehistoric horses

Daniel Ryczek, Taxonomic Review of *Agnotocastor* from the Cedar Pass localities, Badlands National Park, SD

Morgan Summers, Black Hills amazonite: trace elements and implications of its presence

Jason Testin, Dental variation in polycotylid plesiosaurs

Ashley Trennepohl, Effects of restoration on phosphorus speciation in South Dakota wetlands

Jennifer Trosvig, An investigation of historical groundwater contamination at Rockerville Campground and Kamp Kinship, SD

From Our Emeritus Professors:

Perry Rahn

This past year I have been thinning trees on my 160 acres near Hill City. There is a growing problem with Mountain Pine Beetles in the Black Hills and elsewhere in the Rocky Mountains. This fall I had 200 big trees logged off. I cut down the smaller infected ones and burn them up. It looks like eventually the Ponderosa Pine trees in the entire Black Hills are doomed. Right now the Harney Peak area looks all brown due to the dead trees.

Jim Fox

Jim retired after the spring 2008 semester. We see him periodically in the department.

Jack Redden

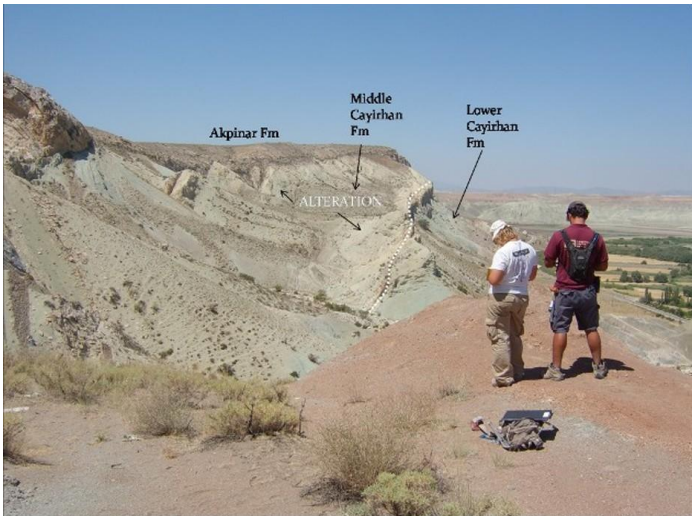
Jack is still active in research on various issues relating to Precambrian geology of the Black Hills. Jack is often found working in his office in the department. He has decided to spend winters in Arizona with his daughter.

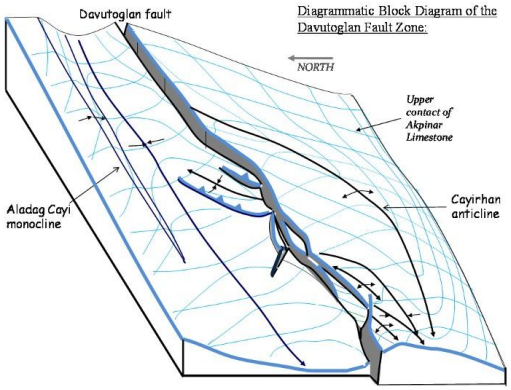
Alvis Lisenbee

Twenty ten was a happily busy year for me with many returns to places of the past. The early months included preparing presentations for the Geological Society of America Rocky Mountain Sectional meeting in Rapid City. Dr. Davis, Dr. Price and I, along with several graduate students, presented from the work on a GIS-based, Ground Water Atlas, including maps of structure contours, depth-to-aquifer, aquifer vulnerability, and aquifer susceptibility for the various aquifers of the Rapid City area. In addition, I was co-leader, with Eric Erslev, of a Laramide of the Black Hills field trip. It was good to have Scott Cooper (photo) along once again to share his knowledge of Laramide fractures as we climbed the Fanny Peak monocline near Newcastle through the quiet of gently falling snow (it was spring time in the Rockies). The geology remains much the same as

when Joyce Fry did her M.S. thesis there in the 1970"s. We didn"t see a mountain lion as she had done, however.

Nuri, Mike and I attended another GSA Conference in Ankara, Turkey in the fall and presented a talk there derived from one of the International Field Camp exercises which we have worked on for the past seven summers. As with all the areas used in the five week field camp, the Davutoglan area is a plum of a study – beautiful desert exposures of Miocene lake beds deformed by a small strike-slip fault system. The photo below shows Danielle Ollinger and Shant Minas on the fault. The field camp is a joy to participate in as a teacher and the reviews from students who attend are universally positive. It is really something I look forward to each summer.





In addition to the conference presentation, we attended a field trip across western Turkey (the Asian portion known as Anatolia) that passed through my old dissertation area at Orhaneli. This region is one of high-pressure metamorphic rocks, subducted to perhaps 80 kms depth. There are numbers of people studying portions of this region today, unlike the late 1960"s when I was a student wandering there and wondering how this new thing called Plate Tectonics might apply. We are back at Orhaneli – Mike, Nuri, myself and two M.S. students, Umit Yildiz and Al Garraffa -- examining the contact of a large sheet of peridotite which lies on the blueschists. How did it get there? Apparently not exactly as an ophiolite thrust sheet as I interpreted it in the dissertation. The Ankara GSA conference dealt with tectonic evolution of the Middle East and was well attended. There were a number of talks on Iran (only one by an American) which called to my mind the work which I had done there in Pb-Zn exploration in the 1970s for the Fathi family of Esfhan (two of their four sons took degrees in mining at SDSMT). I decided to prepare a manuscript, based upon that work, and that is nearing completion. As shown in the photos below, the desert exposures of deformed Cretaceous

strata there are exemplary, showing regional folding overprinted by a strike slip fault system. We did find a new ore body there, just in time for the Iranian revolution to drive the Fathis from the country.

On a brief vacation, Kathleen and I travelled across western New Mexico and northeastern Arizona, passing through the village of Magdalena, NM. The town was founded to support the mining of zinc there in the late 1800s. I prepared a review of the mining geology of the area for Armco Steel in the early 1980s, showing that the deposits occur in Mississippian limestone in the wall of a caldera. That wasn‟t my first visit, however. As a student at the University of New Mexico in 1960, several classmates and I went underground in the Kelly mine to obtain some beautiful specimens of smithsonite, the blue-green zinc carbonate (see photo), for which the mine is famous. As it was well after midnight when we arrived, we thought it would be rude to wake the property owner and ask permission before descending the 800 feet of wooden ladders to reach the rusty drifts below.

Near Holbrook, Arizona, where I had my first job as a geologist looking for petroleum and helium – we found potash instead – Kathleen and I visited Petrified Forest. I learned that the giant logs there, lacking roots, branches, and bark, were really Texans who had floated across New Mexico in the Triassic in a great river system.

In the spring and early summer I participated with a group, including Foster Sawyer, preparing the Oil Conference which the department sponsors each fall on campus. Over 100 professionals attended, and we are already working as a group to prepare for next fall (October). The conference was originally conceived by Creties Jenkins and he has been a strong backer every year.

Foster and I are also working on a petroleum-related project in the Powder River Basin. Using funding generated by the conference and donations by Creties Jenkins, three graduate students (Al Garraffa, Andrew Clift, and Ivana Stevanovic-Walls) are compiling past M.S. theses plus new drilling data into a GIS-based look at the evolution of the Big Horn Uplift-Powder River Basin margin. We hope to present the first results at the Rocky Mountain Section meeting of AAPG this year.

Bill Roggenthen

Dr. Roggenthen is working as the Co-PI for the NSF DUSEL proposal. He is either in his office here, at Homestake or traveling to Berkeley for various meetings. He also has a funded research project in the mine looking at micro seismic events and ground motion. 3-axis accelerometers were cemented in sand holes on the 2000-ft level and are used for seismic monitoring.

Progress at the Lab can be followed by viewing the SDSTA and Lawrence Berkeley websites: http://sanford.org and http://www.lbl.gov/nsd/homestake/

From the Faculty:

Arden Davis

During the past year I continued my work with the ABET Board of Directors. I enjoy the change after five years of duty as a team chair for accreditation visits, as a member of the Engineering Accreditation Commission. The ABET board met recently at the annual meeting in Baltimore, Maryland.

In the summer of 2010, Dr. Cathleen Webb (now at Western Kentucky University), Dr. David Dixon (Chemical and Biological Engineering), and I received a U.S. patent for our limestone-based arsenic-removal process. We've applied for a new patent involving removal of heavy metals. Currently, Dr. Dixon and Dr. Sookie Bang (Chemical and Biological Engineering) are collaborating with me on interdisciplinary research involving the potential role of bacteria in the arsenic-removal process. Results from previous work were published in the journal, "Environmental Geology." I also presented the results of previous work at the SME Annual Meeting in Phoenix, Arizona. It was enjoyable to see some of the alumni at the meeting.

Dr. Lisenbee and I also are continuing our aquifer vulnerability work in the Rapid City area. Along with Dr. Maribeth Price, we are compiling an atlas of several quadrangles in the eastern Black Hills.

As in past years, during the summer my wife and I continued to take care of the farmstead in Minnesota where I grew up. The buildings, lawns, and orchard always need tending, but the outdoor work is a welcome change.

Larry Stetler

I have been keeping busy with classes and completed re-writes of lectures for 2 courses last fall. I will be doing the same for my other courses as I teach them. I have 2 MS students I work with and 2 PhD students as well.

My research areas remain broad but have been focused into 2 areas of late: 1) erosion studies at Badlands National Park (see Figures below) and working on several projects at Homestake DUSEL.

At Badlands, I am working with Dr. Rachel Benton, Park Paleontologist, on establishing erosion monitoring sites for the purpose of building an erosion model. The resulting model would be utilized by Rachel and her co-workers to better plan for and manage the fossil resources of the Park. The big unknown is how long, after a fossil begins to be uncovered, is it exposed before it is destroyed by that exposure. Knowing this would be a big assistance in the resource management arena. I have devised a set of erosion pins that are driven into a vertical exposure of fossil-bearing strata and are measured using a high-resolution digital caliper. I am also using sediment trays that I constructed from PVC that are dug into the base of a slope and the eroded material is captured in them. The length of the tray times the slope height provides the area that produced the material. Each monitoring site also has a rain gage so precipitation patters can be used in the modeling process.

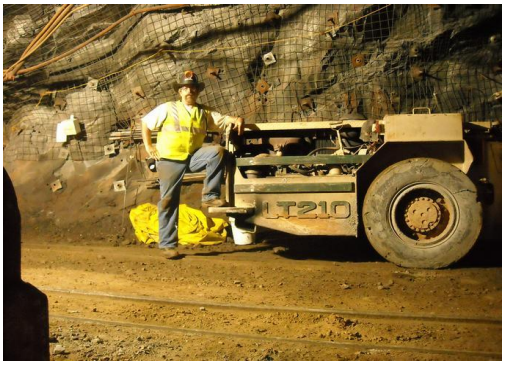
Left: Hot, dry, and rugged at Badlands at the end of July.

Beautiful turtle I named "My Turtle". You should see "My Other Turtle"!

Left: Oreodont skull.

Using the digital micrometer to measure pin *'stick-up'*.

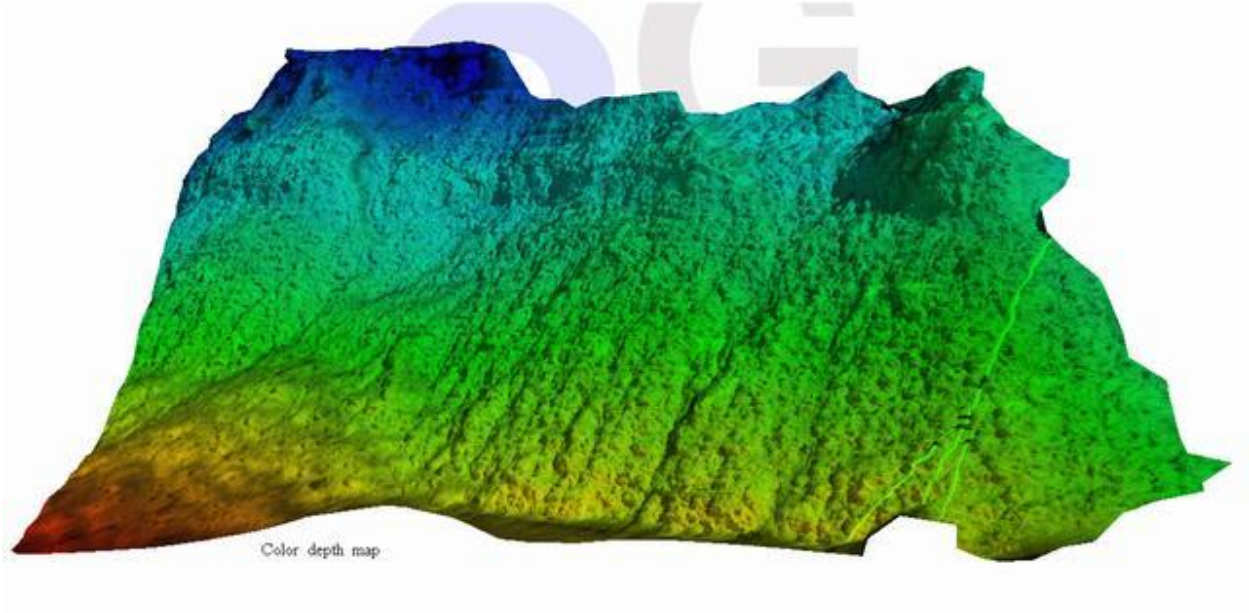
At DUSEL, my NSF-funded research period has ended, although all of the instruments remain underground. As you might be aware, last Feb. 15 (2010), the National Science Foundation and the Sanford Lab removed access permission for anyone not associated with Sanford Lab or DUSEL (and has only recently been removed). As a result, all of my data collection ended on that date. However, I obtained a research contract with DUSEL last spring to conduct pressure tests in 9 core holes drilled on the 4850-ft level into the areas that will potentially receive large cavities or research lab modules. Each of the wells were equipped with a 10,000 psi wellhead and I installed pressure release valves and gauges on each. The pressure buildup phase began some ~200+ days after drilling where flow rate and water quality data were routinely collected. These pre-shut-in data were used with the shut-in data to create pressure buildup plots using the Horner Time-Function analytical technique (revived from my old oilfield days). The figures below provide an indication of the extremely low flow rates and low pressures observed. The buildup phase continues to the present and two of the wells will be changed over to electronic pressure transducers in the upcoming future.



Left: Well at 4850-ft level full of water. Right: Typical wellhead ready to begin pressure build-up test.

Left: All wells were „televiewed" where the hole was video recorded to view structure, fractures, etc. Right: Me on the 4850-ft level between well monitoring tasks.

I was able to obtain a 3G Software and Measurement photogrammetry system in summer 2010. The camera allows the creation of 3-D images in high resolution from which geomechanical data can be obtained. I will be using this at DUSEL for fracture analysis and at Badlands to acquire precise erosion rates. A typical 3-D image from Badlands is shown below.



Above: 3-D color depth map of an outcrop at Badlands. Image resolution is 2.5 mm.

In 2010, I remained active in publishing research results. The following list details these works.

Manuscripts in Review:

1. Stetler, L.D., J.J. Stone, and A. Schwalm. 2011. *Field Sampling Protocol for Abandoned Uranium Mine Site Characterization: Part 1—Soil Cores and Water*. In Review, Environmental & Engineering Geoscience.
2. Stetler, L.D., J.J. Stone, and A. Schwalm. 2011. *Field Sampling Protocol for Abandoned Uranium Mine Site Characterization: Part 2—Surface Soil and Aerosol Dust*. In Review, Environmental & Engineering Geoscience.
3. Stetler, L.D., J.J. Stone, and A. Schwalm. 2011. *Offsite Impacts From Abandoned Uranium Mine Sites: Part 3—A Case Study.* In Review, Environmental & Engineering Geoscience.

4. McCutcheon, C., L. Stetler, S. Chipps, and J. Stone, James. 2011. Relations between Water Quality and Mercury Fish Tissue Concentrations for South Dakota Natural Lakes and Impoundments. In Review, Environmental Engineering Science.

5. Murdoch, L., L. Germanovich, H. Wang., T. Onstott, D. Elsworth, L. Stetler, and D. Boutt. 2011. Hydrogeology of the vicinity of DUSEL Homestake. In Review, Hydrogeology Journal.

Manuscripts Published:

1. Volk, J., V. Shiltsev, A. Chupyra, M. Kondaurov, S. Singatulin, L. Stetler, and J. VanBeek. 2010. Hydrostatic level systems at Fermilab and DUSEL. Proc. 11th International Conference on Accelerator Alignment, DESY, Hamburg, Germany. Sept. 13-17. 5p.

2. Stetler, L., A. Lisenbee, K.Katzenstein, and J. Epstein. 2010. The Black Hills and I-90/Hwy 79 Development Corridor. in Terry, M., E. Duke, and J. Tielke, (eds). Geologic Field Trips in the Black Hills Region, South Dakota. Bulletin No. 21, South Dakota School of Mines and Technology, Rapid City, SD. P49-71.

3. Stetler, L.D. and J.J. Stone. 2010. Environmental Geology of Abandoned Uranium Mines, Harding County, South Dakota. in Terry, M., E. Duke, and J. Tielke, (eds). Geologic Field Trips in the Black Hills Region, South Dakota. Bulletin No. 21, South Dakota School of Mines and Technology, Rapid City, SD. P128-138.

Manuscripts in Press:

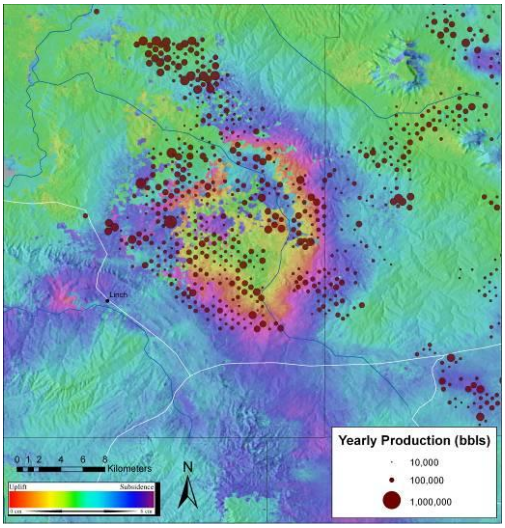
1. Stetler, L.D., J.T. Volk, J.K. VanBeek. 2010. Slow ground motion studies at Homestake DUSEL. Proc. SD Acad Sci., 89:29-41.

2. Van Beek, J., J. Heise, W. Roggenthen, L. Stetler. 2010. Opportunities and challenges: experiences in performing research at the Sanford Underground Laboratory at Homestake. Proc. SD Acad Sci., 89:25-28.

3. Meyer, F.D., S. Bang, S. Min, L.D. Stetler, and S.S. Bang. 2011. Microbiologically-Induced Soil Stabilization: Application of *Sporosarcina pasteurii* for Fugitive Dust Control. Proc. Geo-Frontiers, Advances in Geotechnical Engineering, Dallas, TX, March 13-16. Paper 1189, 10p.

Kurt Katzenstein

Another year has come and gone, I hope things are going as well for you as they are for myself and my family. This past year has been a very busy one for me. I taught nine courses: Geology for Engineers, Earth Systems Engineering Analysis, Regional Field Geology (more on this below), an independent study course covering Radar Interferometry, Stratigraphy and Sedimentation, Introduction to Geological and Mining Engineering, Mineralogy and Petrology for Mining Engineers and Introduction to Remote Sensing. I also was the lead instructor during all five weeks of the Geological Engineering field camp here in the Black Hills. I (as were all GEOE faculty) was also busy early this Fall with our (successful) ABET Accreditation visit. I also helped out with the Rocky Mountain Section Geological Society of America meeting that we hosted here last April. On top of my many professional activities, my wife Lisa and I welcomed Brianne Marie Katzenstein into our lives on December 30, 2009. She is an extremely happy and healthy little tyke and we are enjoying her immensely.



My Radar Interferometry (InSAR) research is still very active. Currently I am utilizing InSAR to investigate land subsidence resulting from Coal Bed Methane (CBM) production in the Powder River Basin of Wyoming. I presented results from this work at the Geological Society of America annual meeting in Denver as well as at the Horizons Oil and Gas Conference here at SDSM&T (see figure at left). I also am continuing research to analyze bedrock subsidence resulting from mine dewatering in the Carlin Trend of Nevada.

In March I led the 2009 spring trip (GEO 403 – Regional Field Geology) to tour areas near my hometown in California. Myself and Foster Sawyer (thanks Foster!) led 23 students on a trip west that included visits to Ichthyosaur State Park, Mono Lake, Mono Craters, Long Valley Caldera, Owens Valley, Death Valley, Zion, Bryce, Capitol Reef, Goblin Valley, Arches, and other great locales in the southwest. Overall it was a fantastic trip and was something that I look forward to doing again in the future.

It was another successful year for the Tech Geological Association (TGA) as well. We now have 34 active members and enjoyed several activities this year including climbing Harney Peak, Bowling night vs. other student organizations (TGA won of course!), ice fishing, a visit to Fugro Horizons, and outreach activities including taking Fairburn elementary students to the Fairburn agate beds and teaching students at Corral Drive Elementary about the geosciences.

During the upcoming year I plan to continue to refine my curriculum as well as focus on research efforts, including expanding the InSAR research I mentioned above as well as explore avenues for future funding and new geotechnical equipment. New equipment would allow us as a department to become more involved in the geotechnical sector of Geological Engineering and will allow me to begin to establish a broader research thrust.

Foster Sawyer

Greetings to all of our alumni and friends! It‟s been an incredibly busy year filled with enjoyable activities involving our fantastic students and our exciting Department! Highlights of the past year include hosting the 2010 Geological Society of America Rocky Mountain Section meeting, successfully negotiating the ABET accreditation process for our geological engineering program, securing a five-year cooperative grant from the National Science Foundation (NSF), co-leading the spring break field trip to Death Valley, being elected national Vice President of the American Institute

of Professional Geologists (AIPG), hosting the "New Horizons in Oil and Gas" conference, teaching numerous courses, and watching many students from our various degree programs walk across the graduation stage and enter into rewarding careers.

Teaching classes and advising students is an important part of our mission, and in 2010 I taught or co-taught seven courses including Geophysics, Invertebrate Paleontology, Petroleum Production, and Rocky Mountain Stratigraphy, among others. A full session teaching geologic field mapping at Ranch A occupied part of the summer, along with preparation of several grant proposals and preparation for the ABET review in September.

Student associations are growing in the Department, and I currently am faculty advisor for the Tech Geological Association (TGA) and the Student Chapter of the Society of Petroleum Engineers (SPE). TGA activities last year included student outreach to several local elementary schools, as well as outdoor activities such as snow shoeing, ice fishing, and orienteering. I also was major advisor for two graduate students, Ryan Tucker and Natalie Toth, who completed their M.S. degrees this year.


Tech Geological Association on a field trip with students from Fairburn Elementary School (left), and snow shoeing in the northern Black Hills (right).

Preparation of grant proposals is another major activity at SDSM&T, and this past year has been quite interesting. In September, I became Director of a five year, educational grant from NSF to work cooperatively with Oglala Lakota College (OLC) and South Dakota State University (SDSU) in an effort to increase the number of Native American students graduating with engineering degrees from SDSM&T and SDSU. Other recent grant proposals in which I am involved are focused on geothermal research, oil and gas exploration, and water quality investigations.

Mention also should be made of the oil and gas conference titled "New Horizons in Oil and Gas" that SDSM&T hosted in October, 2010. Feedback was extremely favorable, and the field trip was a great success. Next year"s conference promises to be even better with a core workshop and technical short course (tentative) in association with AIPG.

Another interesting development is the upcoming visit to our campus in January and February, 2011, by approximately ten representatives from the Saint Petersburg Mining Institute, Saint Petersburg, Russia. The Saint Petersburg Mining Institute is the oldest engineering university in Russia and is home to one of the world"s finest collections of gems and minerals. The purpose of their visit is to develop international professional and industrial relationships, and we hope to lay the foundation for a strong relationship with these representatives of this renowned institution.

As always, there are more activities than time and space to describe them. Some additional items, events, and publications are given in the list below. Thank you for your interest in the Department of Geology and Geological Engineering and for your support as we move forward to meet the challenges of the future!

- Election to AIPG National Vice President (2011); currently serving on AIPG 2010 National Executive Advisory Board; part of the team that is bringing the annual national meeting of AIPG to Rapid City in 2012
- West Dakota Water Development District Board of Directors
- Technical Committee Chair, 2010 GSA Rocky Mountain Section Meeting
- Vice President, Inyan Kara Group, LLC
- Board Member, Black Hills Digital Mapping Association, Inc.
- Provided expert testimony regarding Pennington County on-site wastewater treatment system inspection ordinance
- Putnam, L.D., Sawyer, J.F., Rahn, P.H., and Anderson, M.T., 2010, Karst and fractured aquifer hydrogeology in the Rapid City area, South Dakota: road log, field trip 3, *in* Terry, M.P., Duke, E.F., and Tielke, J.A., eds., Geologic field trips in the Black Hills region, South Dakota: South Dakota School of Mines and Technology Bulletin no. 21, p. 36-48.
- Uzunlar, N., Lisenbee, A.L., Paterson, C.J., Terry, M., and Sawyer, J.F., 2010, Traditional geology field camp: A capstone course at Black Hills Natural Sciences Field Station (SDSMT) [abs]: Geological Society of America, Abstracts with Programs, Vol. 42, No. 5, p. 438.
- Hendricks, R., Sawyer, J.F., Stamm, J., Mahan, S.A., and Zaprowski, B.J., 2010, Timing of the Belle Fourche-Little Missouri River stream piracy event and related Black Hills terraces systems from optically stimulated luminance dating techniques, Wyoming and South Dakota [abs]: Geological Society of America, Abstracts with Programs, Vol. 42, No. 5, p. 181.

Ed Duke

Ed Duke has been busy directing the South Dakota NASA Space Grant Consortium and the South Dakota NASA EPSCoR Program. The programs provide close to $2 million annually for research and education projects across the state. In addition, Ed runs the scanning electron microscopy lab, and he offered a new SEM class this fall that drew 35 students from a variety of disciplines. In his spare time, he is finishing a research project on metamorphic conditions in the Belt Supergroup using information derived from NIR spectra of over 1000 samples.

Darrin Pagnac

Greetings and a happy holiday season to you all. The past year has been filled with many exciting new developments for me professionally, and the upcoming year looks to be even more exciting.

In May I finished my time as the Haslem Postdoctoral Fellow, but for the best of reasons. I accepted a tenure track position as Assistant Professor of Geology/Paleontology with the Department of Geology and Geological Engineering. I am overwhelmingly excited and thrilled to be a new member of the faculty here at SDSMT.

Last March I journeyed across the Pacific on my first international trip. I accompanied my doctoral student, Huai-Pin Hu, to his homeland of Taiwan. There we saw some of the sights and explored collaborative research and education opportunities between National Cheng Kung University in southern Taiwan, and with the National Museum of Natural History in Taichung. Taiwan, although not abundantly fossiliferous, has a rather extensive record of late Pleistocene vertebrates, particularly from the southern part of the island. My doctoral student and I will be conducting descriptive research on the many types of Ice Age animals migrating to and from Taiwan and mainland China, including horses, deer, mammoths and mastodons, water buffalo, tigers, hyenas, and many other small carnivores and rodents. We will be returning to Taiwan this March to continue our efforts there.

In June I attended the Society of Vertebrate Paleontology annual field trip symposium. This year it was held at John Day Fossil Beds in central Oregon. I was an invited guest lecturer where I discussed the paleontology and geology of the medial Miocene, particularly of the local Mascall Formation in central Oregon. It was a very productive meeting and I made a number of new contacts which will undoubtedly result in future collaborative research efforts.

The summer of 2010 was extremely busy for everyone associated with the paleontology program here at Tech. We began the move into the new Paleontology Research Laboratory in early July. The new, 33,000 square foot facility will house the research aspects of the program, including the fossil and recent collections, preparation laboratory, molding and casting laboratory, a dedicated library, archival space, and very nice office space for everyone from faculty to graduate students. The atrium of the building is adorned with a family of brontotheres donated by the Field Museum in Chicago. As the museum‟s mascot, we are happy to provide this trio with a new home.

In July I also returned to the late Jurassic Little Houston Quarry in the Morrison Formation near Sundance, WY. We had a very successful, but brief season. Student and interested avocationalists helped work the quarry for two weeks in late July. We successfully removed a femur (thigh bone) of the large herbivorous dinosaur *Camarasaurus*. We will be returning to this quarry in the summer of 2011 where, in June, we will celebrate the 20th anniversary of the discovery of the site by former MS student John Foster, now with the Museum of Western Colorado in Grand Junction.

The fall holds many new and exciting projects and challenges. With my new

faculty appointment I have taken on new teaching responsibilities, including historical geology, dinosaurs, and invertebrate paleontology. I continue to have a pretty heavy advisement load of graduate students, but I still consider this the most rewarding aspect of my job. This year I will graduate one more Master‟s student, Ed Welsh, who finished his research on late Oligocene/early Miocene evolution of the Badlands oreodont *Leptauchenia*. I also continue to publish on solo projects, as well as collaborative projects with my current and former students.

The coming year holds new and exciting opportunities, and I look forward to meeting them head on and relating the future successes of both myself and my students. As always, thank you for your continued support.

Mike Terry

Michael Terry spent the spring semester teaching structural geology and optical petrology, co-chairing with Larry Stetler the Rocky Mountain GSA Meeting, and consulting on the Geology of the Deep Underground Science and Engineering Laboratory. The GSA meeting was very successful due the participation of our faculty and students. There were 414 total registered attendees, of which 256 were professionals and 121 were students. The remaining attendees (41) were exhibitors, staff, teachers, or spouses, or those attending only a field trip or short course (4). The 2010 meeting had the highest attendance of any RMS Annual Meeting (excluding jointly-held meetings) since 1999, which is a credit to the meeting organizers. The 2010 meeting included 18 theme sessions, and 11 field trips.

Also in the spring, his advisee Jake Tielke completed a spectacular thesis that developed a technique for using Electron Backscatter Diffraction to determine the paleo-stresses from calcite deformation twins. Jake is now perusing a Ph.D. at the University of Minnesota. Terry also worked with Colin Patterson to re-design MI-324 the optical petrology lab and prepared the room it for renovation. We now have a spectacular new lab!

Much of the summer was spent in Turkey with Alvis Lisenbee and Nuri Uzunlar advising graduate students and teaching our field camp. Students Umit Yeldiz and Alfred Garaffa carried out detailed mapping and sampling along the suture where high-pressure blueschist facies rocks are juxtaposed against lower pressure rocks in order to determine conditions of metamorphism and explore the ways in which these rock were brought back to the surface. This work was complemented by a trip to Norway to examine where Terry participated in the pre-meeting field excursion and was co-leader for one day of the trip. While in Norway, Terry also spent a few days mapping with Rebecca Jamieson and her graduate students from Dalhousie University that were mapping just north of his dissertation area in order to give some insights into their efforts to understand the formation and evolution of ultrahigh-pressure metamorphic rocks.

This fall semester was spent teaching igneous/metamorphic petrology and advanced field geology. The advanced field geology course had 16 students this year due to the recruiting efforts of our department Chair Maribeth Price and faculty. Terry also participated in the Fall GSA-meeting.

Colin Paterson

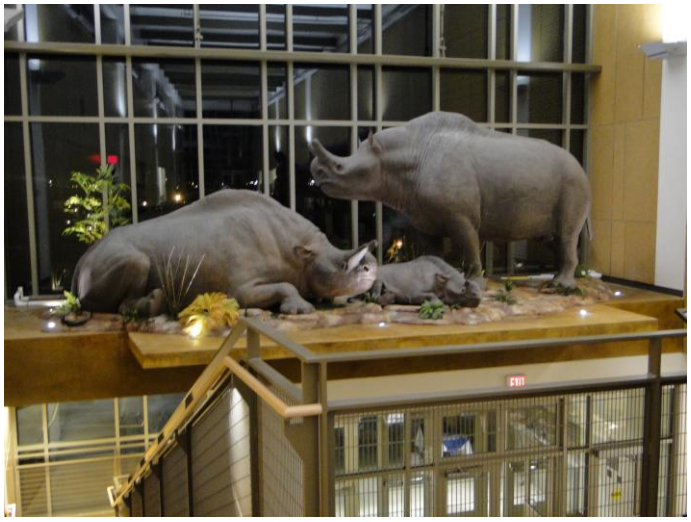
One graduate student completed and two others are undertaking ore deposit theses on the Homestake deposit, using core and documents from the archive as the mine transitions to the national underground lab. With Mike Terry, I led the Homestake geology field trip for the GSA Rocky Mountain section meeting in April. Two graduate students are initiating theses on the Cortez gold deposit in Nevada, and the Endako porphyry molybdenum deposit in British Columbia. There are quite

a few enquiries from students considering ore deposit research, but the challenge is finding resources to support them. Of particular difficulty is attracting funding for graduate student stipends – it is time for mining companies to look to the future and to invest in the new generation of potential employees. If you are in a position to help, or if you have potential research projects available, email colin.paterson@sdsmt.edu

I continued to serve as geology instructor for the course IS 110 Explorations for all entering students majoring in science at SDSM&T. The theme for Fall 2010 was "Energy". This is the vehicle for teaching freshmen to practice critical thinking as they begin their college career. I spent 5 weeks teaching field camp at Ranch A in the summer, and was an invited contributor in a Goldcorp workshop on iron-formation hosted gold deposits in Thunder Bay (Ontario) and at the Musselwhite mine to the north. The Society of Economic Geologists student chapter continues to be very active in the department with about 40 members involved in monthly meetings and field trips. The chapter sponsored the spring department picnic, and provides refreshments for the department Friday seminars. I am organizing and leading the spring break trip to New Zealand during March 3-15, 2011 – we have a total of 25 participants, including faculty, students, and alumni. In addition to spectacular geology, anticipated highlights will be lounging in our own hand-dug hot pools at Hot Water Beach, a full day hike across the active volcano of Mt Tongariro, visits to active and historic gold mines, and a traverse along the Alpine Fault on the Pacific/Australian plate boundary.

James Martin

The dream of 20 years became a reality during 2010. On September 1st, the ribbon-cutting occurred for the new Paleontology Research Laboratory, with Governor Mike Rounds officiating. A research, teaching, and reposition facility funded by the state and donors such as the Leroy Foster family and the Frank M. and Gertrude R. Doyle Foundation will finally allow us to conduct in depth studies of fossil vertebrates, invertebrates, and plants, as well as mineral specimens. The facility also represents a teaching laboratory and will provide proper storage for hundreds of thousands specimens. We spent much of the summer and fall moving into the facility, but our large collections and extensive archival records have taken time. We currently are approximately 25% moved. We still have most of the basement of the old gym to empty, including many casts and prepared specimens. We envision that three years will be required before the building is totally operational. Recently, Dr. Robert Wharton, President of our university, announced that the SD Board of Regents has approved the building being named for me; I am deeply honored and humbled by this gesture after 32 years of service. Now that the building is completed, those 32 years will come to an end following this semester when I will officially retire. I hope to spend much of my retirement researching fossil vertebrates that have been collected under my direction, although my wife has a few other ideas as well.



Although the building took most of my time, I did manage to undertake numerous other projects. I led a trip to Fossil Lake, Oregon, and to the Ellensburg Formation in central Washington. We collected numerous important specimens, renewed acquaintances, and made many friends. Some of the interesting specimens include a possible hummingbird and the first salamander from Fossil Lake. I spent much of the summer in field investigations along the Missouri River as the result of funding from the US Army Corps of Engineers. We were very successful, collecting excellent invertebrate specimens, including two large ammonites; we also partially collected the first mosasaur skull from the Gregory Formation, which is an important interval in the evolution of these sea reptiles. We also collected a headless mosasaur, but it contained the first evidence of a plesiosaur in the stomach. And as normally happens, the best specimen was found on our last day along the Missouri River; a well articulated skeleton was discovered by James Lindley of the Corps. The specimen still had its last supper of fish, and we found fossilized cartilage on the shoulder bones, a rarity in the fossil record. We also had the pleasure of collecting a larger specimen of the same species from the 777 Buffalo Ranch south of Rapid City during the fall. We were rewarded when we found cartilage on the shoulder blade of this specimen as well. We are currently preparing a scientific contribution concerning these rare fossil preservations.

Jim gave three scientific presentations during 2010: one at the SD Academy of Science concerning fossiliferous nodules that were gnawed by modern prairie dogs for calcium salts; at the Society of Vertebrate Paleontology concerning the fossils from the Wilbur site, a Miocene assemblage from near Yakima, and at the Geological Society of America annual meeting concerning radiometric dates from the upper portion of the Pleistocene Fossil Lake Formation in Oregon. He also advised a number of graduate students, and was delighted when Shawna Johnson completed her Master‟s degree and Randy Moses completed his Ph.D. in May. Lynn Harrell completed his Master‟s and Wayne Thompson is close to finishing his Ph.D. this December.

I look forward to a productive retirement, and I sincerely thank my colleagues and outstanding students who have supported my efforts during my career at the Museum of Geology and Department of Geology and Geological Engineering.

Aaron Wood

I just recently joined the department as the new Haslem Postdoctoral Fellow in September and have been working hard on ongoing collaborative projects and initiating new ones with the fossil resources of South Dakota. My MSc and PhD work was conducted at the University of Michigan where I integrated stratigraphic, geochemical, and macroevolutionary analyses to study the early Eocene strata and fauna of the Bighorn and Clarks Fork Basins, WY. Before joining SDSMT, my research focused on how Eocene mammals responded evolutionarily to climatic and environmental change during a time of globally warm conditions. As the Haslem Postdoc, I now have the opportunity to extend this work to the late Eocene-Oligocene of South Dakota and investigate the mammalian response to global cooling and aridification. Combining these studies will allow me to resolve underlying processes that may dictate how mammals respond to environmental change under all climatic regimes in the geologic past.

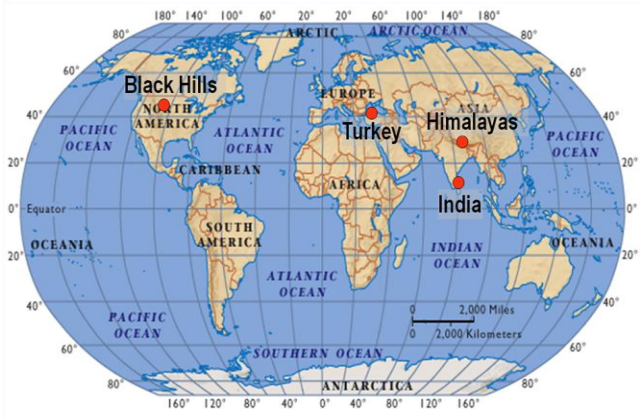
One of the best Wyoming field crews I (second from the left) have ever worked with.

In October, I presented a talk, involving my research interests described above, and coauthored two posters at the 70th annual meeting of the Society of Vertebrate Paleontology in Pittsburgh, PA. One of the posters described an exciting new project concerning paleoenvironmental conditions during the early Miocene of Kenya prior to formation of the East African Rift. Initial field work in northern Kenya was conducted in December 2009 and was such a success that my collaborator, Dr. Ellen Miller from Wake Forest University, and I are preparing a grant proposal to fund a return trip in December 2011 and continue our work with the Turkana Basin Institute.

Early Miocene terrestrial deposits and volcanic tuffs of northern Kenya (left image). The Turkana Basin Institute crew, Dr. Miller (lower right), and myself (upper left) after the 2009 field season in Kenya (right image).

I am very grateful for the wonderful opportunities ahead of me at SDSMT and look forward to continuing interactions and developing collaborations with the great faculty and students within the department. I am particularly thrilled about teaching a new graduate course in the spring that focuses on quantitative methods in paleontology, such as biomechanics, morphometric analyses, and evolutionary modeling. This is an exciting time for the department and Museum of Geology, especially with the new Paleontology Research Laboratory up and running, and I am very glad to be a part of it!

From the Field Station and Nuri Uzunlar, Director



I had a blast with 129 students and 19 summer faculty on three continents. Alvis Lisenbee, Colin Paterson, Mike Terry, Foster Sawyer, Kurt Katzenstein, Darrin Pagnac, Randy Moses, Chris Pellowski were all spent part of their summer teaching the camps. Additional faculty members came mainly from the consortium schools. Thanks to faculty members here at SDSM&T and your support the Field Station now is one of the premiere field schools in the nation and offers camps in the **USA**, **Turkey**, **India** and **Nepal**.

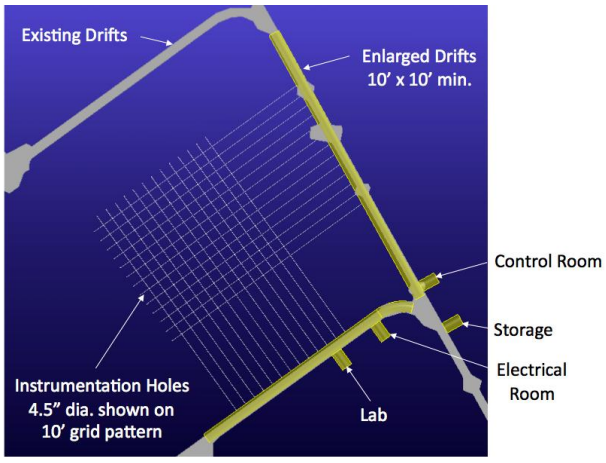
The dream of building a field station somewhere in the Black Hills is still at large. I am looking for a suitable land somewhere in the northern Black Hills. Please contact me if you can help or you know someone who can. Ranch A is a great place as many of you know but with many summer courses and year around activities we need a field station that belongs to us.

Courses offered in the summer of 2011 are listed in the table below.

Field Camps 2011				
USA				
Course No / Session	Credit	Name	Date	Cost
GEOL 410 (Ranch A – Session 1)	6	Field Geology	May 16 – June 17	$3395 Consortium and $3895 non- consortium
GEOL 410 (Ranch A - 2)	6	Field Geology	June 20 - July 22	
GEOE 410 (Campus)	6	Engineering Field Geology	May 16 – June 17	
GEOL/GEOE 412/512	3	Science and Engineering Field Applications	May 23 – June 10	$2695
GEOL/GEOE 492 - TOPICS	1	Freshmen Field Geology	June 6-11	$395
GEOL 376	3	Geospatial Field Methods	TBD	$1395
GEOL 412	3	Vertebrate Ecology and Field Techniques	TBD	TBD
GEOL 371	2	Undergraduate Field Paleontology	Multiple dates - summer	$650?
PALE 671	2	Graduate Field Paleontology	Multiple dates - summer	$750?
Turkey				
GEOL 410 (Session One)	6	Field Geology	June 6 – July 9	$4295
GEOL 410 (Session Two)	6	Field Geology	July 11 – August 13	$4295
Nepal				
GEOL/GEOE 412/512	3	Science and Engineering Field Applications	May 22 – June 8	$4395 student and $5895 non-student
India				
GEOL/GEOE 412/512	3	Science and Engineering Field Applications	TBD	$4350

My DUSEL project titled **Collaborative Research: Coupled Thermal-Hydrological-Mechanical-Chemical-Biological** (THMCB) **Experimental Facility at DUSEL Homestake** was funded by NSF last summer. The proposed work focuses on developing a preliminary design for a large-scale subsurface experimental facility to investigate coupled Thermal-Hydrological-Mechanical-Chemical- Biological (THMCB) processes in fractured rock at depth. The experiment would be part of the proposed Deep Underground Science and Engineering Laboratory (DUSEL) in the Homestake Mine.

Research team (below right) and project layout at 4850 level (left)



My collaborators are Eric Sonnenthal (UC Berkeley and Lawrence Berkeley National Lab), Derek Elsworth (Pennsylvania State Univ.), Barry Freifeld (Lawrence Berkeley National Lab), Robert Lowell (Virginia Tech), Kate Maher (Stanford University), Brian Mailloux (Barnard College).

I also received the John C. Mickelson Professorship Award in 2010 (second year). Funds from this award were used to support two graduate students Umit Yildiz and Alfred Garaffa who worked on research project near Bursa led by Alvis Lisenbee, Mike Terry and I.

In addition to traveling from camp to camp I have been very active in departmental committees and the department‟s graduate and undergraduate recruiting efforts. I attended GSA in Denver, to host a booth on behalf of the BHNSFS and the department and attended to AGU in mid December for DUSEL related research projects and discussions.

For additional information about upcoming field station activities please visit: http://geologyfieldcamp.sdsmt.edu , call me (605) 394–2494 or write: nuri.uzunlar@sdsmt.edu